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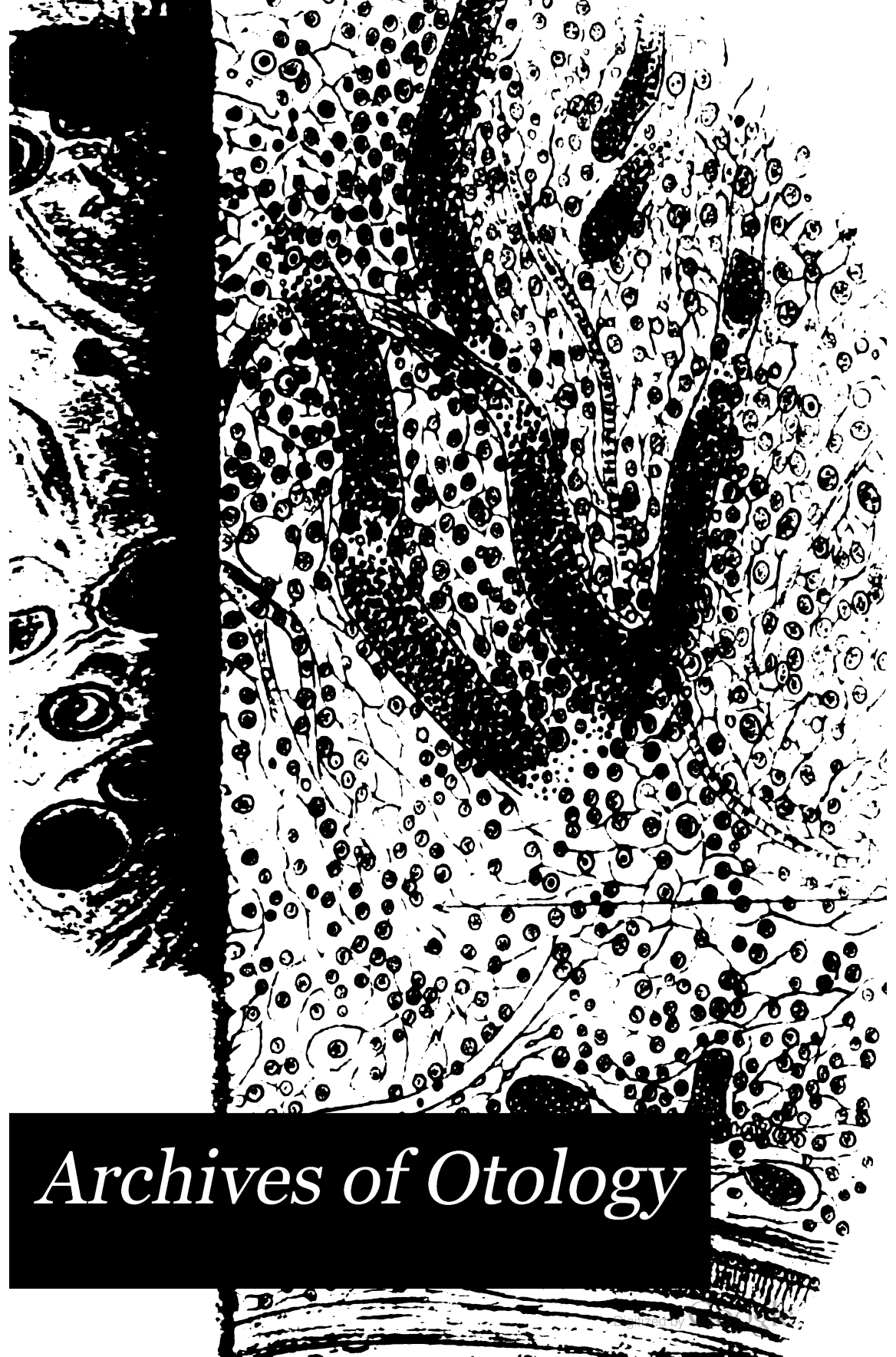
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OF
OTOLOGY

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OF HEIDELBERG

DR. D. B. ST. JOHN ROOSA
OF NEW YORK

AND

DR. URBAN PRITCHARD, LONDON

IN CONJUNCTION WITH

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I. ARCHIVES OF OPHTHALMOLOGY,

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The *Archives of Ophthalmology* will be published four times a year, and each yearly volume will contain about 500 octavo pages, handsomely printed and extensively illustrated with wood-cuts and lithographs.

The subscription, per year, will be \$5, and the price, per number, \$1.50.

II. THE ARCHIVES OF OTOTOLOGY will be issued four times a year, and each yearly volume will contain from 300 to 350 large octavo pages, handsomely printed and illustrated.

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These journals will continue to publish original papers of standard value, comprehensive articles on subjects still under discussion, and systematic reports on the progress of Ophthalmology and Otology, thus keeping their readers informed of every thing that is interesting to know, scientifically of importance, and, above all, practically useful.

Communications relating to Ophthalmology should be addressed to **DR. H. KNAPP**, 25 West 24th Street, and those relating to Otology either to **DR. H. KNAPP**, **DR. ROOSA**, 20 East 30th Street, New York, N. Y., or to **DR. C. J. KIPP**, 534 Broad Street, Newark, N. J.; those relating to the business of the journals to the publishers,

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ARCHIVES OF OPHTHALMOLOGY

NOTICE TO OUR READERS.

The ARCHIVES OF OPHTHALMOLOGY contain *original papers* on all branches of ophthalmic surgery, and *original reports* on the progress of ophthalmology. The original papers occupy from two thirds to three fourths of the space, and their scope embraces all subjects of scientific and practical interest connected with this department of medicine.

The object of the ARCHIVES is to guard, solidify, extend, and diffuse the stock of acquired ophthalmic knowledge by recording the constant addition of new observations, investigations, methods and means of examination, clinical experience, instruments and remedies, and further by taking part in the discussion of the questions of the day with a spirit alike conservative and progressive.

Particular attention is paid to the preparation of the Report on the Progress of Ophthalmology. The report is intended to furnish a *complete, systematic, and early* review of the current ophthalmological literature of the world. It has been necessary to divide the work of its preparation among a number of collaborators according to the following arrangement :

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In the interest of our readers, who are scattered over the whole world—and whom, like ourselves, we desire to keep informed of all advances in ophthalmology,—furthermore in their own interest, authors of ophthalmological works are requested to send reprints, duplicates of journals, or copies for reviewing, to one of the above-named reporters, or to the editors or publishers of the Archives, according to their convenience.

The abstracts of American ophthalmological literature formerly appeared under a special head, but are now embodied in the systematic Report. Text-books may be specially noticed.

The number of good papers offered us for publication has increased to such an extent that it is no longer possible to translate all of them unabridged. Whenever a German paper is condensed in the English version, or *vice versa*, it will be so stated. Should any one of our readers wish to recur to the original, the editors will always take pleasure in sending it for reference.

Under the heading of "Miscellaneous Notes," there will be published all kinds of professional news which specially concern the oculist, *e. g.*, appointments, honors, resignations, vacancies, new ophthalmic hospitals, opportunities for instruction, prize questions and essays, announcement of Society meetings, etc. Brief notices of this kind will be thankfully received by the editors.

Original papers of value from any source will, as heretofore, be welcome to the ARCHIVES, and are solicited.

EDITORS:

H. KNAPP, M.D.,
25 WEST 24TH STREET, NEW YORK.

C. SCHWEIGGER, M.D.
ROONSTR. 6, BERLIN.

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a. Authors will receive gratuitously twenty-five reprints of their articles. If a greater number is desired,—notice of which should be given at the head of the manuscript,—only the additional cost of presswork and paper will be charged to the author.

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ARCHIVES OF OTOTOLOGY

PROSPECTUS

To answer questions often addressed to the editors and publishers of the subjoined periodical, we reprint as a Prospectus the Preface to Volume Twenty of the

ARCHIVES OF OTOTOLOGY

EDITED IN ENGLISH AND GERMAN

BY

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AND

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It may be opportune to introduce the twentieth volume of the above periodical with a few prefatory remarks. Dr. Thos. Barr, as president of the Otological Section of the British Medical

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Association, at its Glasgow meeting in 1888, suggested "that it would be well if there were an **English editor** of the **ARCHIVES OF OTOTOLOGY** in the contributions to which it would also be desirable that British otologists took a larger share." The editors of the **ARCHIVES** were but too happy to act on this suggestion. On Dr. Barr's proposition they invited Dr. Urb. Pritchard to join them in conducting the **ARCHIVES**, and they congratulate themselves as well as their readers upon Dr. Pritchard's acceptance of the invitation.

GENERAL SCOPE.

The **objects and form of the ARCHIVES** will undergo no change. We intend to publish, as heretofore, original articles on all topics connected with the theory and practice of aural surgery, viz., normal and pathological, human and comparative anatomy, physiology, pathology, and therapeutics of the auditory organ. No personal restriction whatsoever is imposed on any author, providing his contribution be instructive, scientifically presented, and not unnecessarily lengthy. We expect, however, that those who favor us with their papers will not publish them, as such, in any other periodical.

Illustrations can, to a certain degree, be executed at the expense of the **ARCHIVES**; for costly ones the authors will be requested to bear a share of the expense. All drawings should be on separated papers, and their places of insertion indicated in the **MSS.** Clean pen and ink drawings, double the size desired to be put in the text, are particularly welcome.

Besides papers on the organ of hearing proper, we solicit also communications on such of the **neighboring parts** as are in physiological or pathological relation with the ear; in particular the nasal, pharyngeal, and cranial cavities.

The **ARCHIVES** will continue to publish quarterly or half yearly **systematic reports on the progress of otology**. These reports will be no clippings from other journals, but all original and specially prepared by competent aurists in different

countries, namely, Barth and Hartmann in Berlin, Pritchard in London, Gellé in Paris, Swan M. Burnett in Washington, and others.

Books of interest will be specially reviewed.

Under the head of **Miscellaneous Notes** we shall publish all kinds of professional and personal news that may interest the aurist, *e. g.*, appointments, honors, resignations, vacancies, positions, new otological hospitals, opportunities for instruction, prize questions and prize essays, announcements of society meetings, obituaries, etc.

Of society proceedings we intend in future to give only brief résumés, so as to inform our readers as early as possible what has been transacted in such meetings, reserving fuller abstracts for our systematic reports when the papers have appeared *in extenso*.

An elaborate **index** of all the original papers, the abstracts in the systematic reports, and the miscellaneous otological notes will conclude each volume.

In this way we intend to keep our readers informed of all that is published and done in our specialty, thereby to assist them in their studies, their practice, and their investigations.

All contributions should be addressed to one of the editors, business questions to the publishers.

Papers published in the English edition will be **translated** as soon as possible, to appear in the German edition, and *vice versa*. Should any one of our subscribers wish to refer to the original of a translated paper, it will be sent to him on application to one of the editors. When it is necessary to condense a paper, it will be so stated.

The English edition appears in quarterly numbers, four to make a volume of from 300 to 350 pages each year. The German edition issues its numbers irregularly, according as the material comes in. For this reason the volumes of one edition do not agree with those of the other. The plates, being used for both editions, cannot follow in the same order in each, but a special

statement at the head of each translation will indicate to which paper they belong.

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The subscription price of the ARCHIVES OF OTOLARYNGOLOGY will be \$3 (12 shillings) per vol. Single numbers may be had at \$1.00 (4 shillings). Postage (for Great Britain) 3d. per number.

The price of the *Archives of Ophthalmology* is \$5 (1£) per volume. Single numbers \$1 50 (6 shillings). Postage (for Great Britain) 4d. per number. After the present year (1891) no reduction will be made on either the English or American editions, for subscriptions to both journals. The price of these together, will be from January, 1892, \$8.00 (£1.12.0).

NEW YORK, Jan. 2, 1891.

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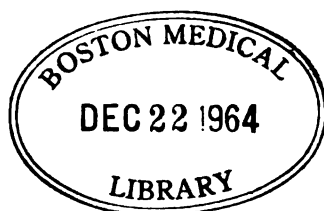
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ARCHIVES OF OTOLOGY.

A CASE OF EXTENSIVE CARIES AND CHOLESTEA- TOMA OF THE MASTOID PROCESS WITHOUT LOCAL SIGNS OF INFLAMMATION. DEATH FROM THROMBOSIS OF THE LATERAL SINUS AND MENINGITIS.

BY DR. HARRY FRIEDENWALD, OF BALTIMORE.

(With two drawings.)

A FEW years ago Prof. H. Knapp,¹ of New York, published a remarkably interesting and instructive case of severe mastoid disease, secondary to otitis media and giving rise to distant abscesses over the occipital bone, in which he was unable to detect any signs of mastoid disease before the post-mortem examination revealed them. Death resulted from cerebellar abscess. Knapp points out the fact that "in this case, as in most others, the chief focus of the formation of pus was the mastoid cavity," and he uses the experience of this case as an argument for the wider extension of the indications for the artificial opening of the mastoid process. F. Tilden Brown² at the same time reported "a case of abscess of the mastoid with entire absence of tenderness, heat, or swelling over the suppurating part, with a constant distant pain near the occipital protuberance," in which recovery followed trephining of the mastoid process and the evacuation of the pus. Cases like these induced Gruber to consider such conditions as indicating the necessity for opening the process, in which "great pain came on in the course of suppurating ear troubles, pain in the side of the head corresponding with the affected ear, and uncontrollable by other means—even when no inflammatory signs

¹ ARCHIVES OF OTOLOGY, vol. xii., p. 44.

² *Ibid.*, p. 56.

could be found in the mastoid region." Other authorities are scarcely as decided, and there is by no means an agreement regarding this subject. Frothingham, reviewing the indications for the artificial opening of the mastoid, before the Ninth International Congress,¹ refers to the "tendency to extend the indications" to cases "in which the surface of the mastoid was free from tenderness and presented in every way a perfectly normal appearance," though he adds that "in many of these cases the indications cannot be clearly made out, and a considerable degree of uncertainty must exist as to the necessity, or even propriety, of an operation." The case I desire to report bears upon the same point; the importance of the subject and the rarity of the case fully justify its publication.

HISTORY.—The gentleman whose history I shall narrate was a patient of my father's and myself. He first called for medical treatment on March 17, 1890, complaining of severe pains in the left ear and dizziness. He gave the following history: As a child he had had measles; since early life he had had a chronic discharge from the left ear. At one time during childhood he had had a "swelling" behind the ear, which had been lanced by a physician and had discharged pus. For many years he had had occasional attacks of pain and dizziness, but never so severe or of such long and continued duration as in this last attack, from which he was already suffering for about three weeks, and which had latterly (March 15th) become so severe as to incapacitate him for his work as clerk. The patient was a hearty-looking young man, and seemed otherwise to be in good health. He had no elevation of temperature; his pulse was 60 per minute. The drum of the right ear was normal and hearing good. The auricle of the left ear was more prominent than the right, being turned slightly forward, but "had always been so." Behind it, and about over the centre of the mastoid process, was a small old scar, the result of opening the abscess mentioned above. The skin was freely movable over the bone. In other respects the mastoid process seemed normal, though there was a point somewhat above the level of the auditory canal which was slightly sensitive on firm pressure. There was a slight amount of flaky, offensive pus in

¹ Transactions, vol. iii., p. 832.

the auditory canal. After washing this out by injecting water (during which procedure the patient fainted), the deeper parts were found filled up with polypi. The hearing was entirely lost. He was given bromide of potash, and warm applications and instillations of cocaine and atropine were made to relieve the pain. The clinical record shows that polypous masses were frequently removed with the snare; nitrate of silver was applied several times; and the ear was washed out daily. But this seemed to have little influence on the pain, which was often very intense, and necessitated the occasional use of morphia. In the second week the iodide was given instead of bromide of potassium. Neither seemed to yield marked benefit, for the pain became even more violent about the end of the second week. There was at this time only one polypus remaining, situated in the upper part of the tympanum. But this was so sensitive that it was impossible to remove it by the snare, the slightest touch causing intense pain. Later, antipyrine was used, which reduced the pain much more effectually, though but temporarily, than any other means, such as warm applications, cocaine, or atropine instillations. At the end of the third week the pain became excruciating, but mercurial inunctions over the body and four leeches applied behind the ear relieved it, and the patient began to improve rapidly. From this time on the point of sensitiveness over the mastoid was not to be made out. Absolute alcohol was then applied daily for the polypi, which had grown rapidly during the time that the sensitiveness precluded any operative interference.

On *April 21st*, the patient had improved so much that he was permitted to go to work again. He had no headache; very slight giddiness. "Patient thinks that he is well." Polypi still present, and alcohol not appearing satisfactory, tannin in glycerine was substituted, and daily treatment continued. The patient's condition remained unchanged for almost five weeks. He continued to feel well and able to work as a clerk, and it seemed that he would soon be entirely cured, but on

May 25th, he complained that he had had a chill on the preceding evening, which had lasted some time and was followed by a severe headache, and that he had had a second similar one on the morning of the same day. He did not complain otherwise, excepting of diarrhœa, which had been going on about a week. His temperature was normal. Patient said that he had been in the country a few days before, and the possibility of its being

only malarial fever was entertained, and quinine (5 grs. in capsule) was ordered three times daily.

May 27th.—Is tired, sleepy, limbs feel sore. Has had more or less headache since first chill, which always increased greatly after each chill. The quinine has been kept up, but patient had three chills since he began taking it, in the evening of May 25th, and in the morning and in the evening of May 26th, but none to-day. Has *tinnitus aurium* from the quinine.

May 28th.—Had no chill yesterday or to-day, but sweats profusely and had severe headache last night. Still drowsy; has lost appetite; giddiness worse. Took castor-oil for the diarrhœa. At 3 P.M., temperature 100° , and pulse 94. His appearance is not bad.

May 29th.—Consultation with Dr. Preston. Patient was again thoroughly examined. His temperature in the morning 97.5° , in the afternoon 100° . The sensitive spot behind the ear has reappeared; on deep pressure he winces slightly. Polypi still present. Percussion of skull not painful; otherwise no abnormality; liver and spleen not enlarged. There is nothing pointing to thrombosis of lateral sinus, no sensitiveness or hardness in pressing jugular vein; no ophthalmoscopic change. Pupils react normally. While cerebral complications are suspected, it still seems unwarrantable to change the diagnosis of malarial fever, and quinine is continued. Had chill in afternoon.

May 20th, 9 P.M.—Pulse, 100; temperature, 103.5° . Headache intense. Antipyrine (10 grs.) given and headache relieved. Had had a chill at 2 P.M.

May 31st.—Chill in forenoon.

June 1st and 2d.—Chills early in the morning. The chills of late are all followed by great rise of temperature. After this time they became less regular, but even on those days when there were no chills there was always a rise of temperature, which would sometimes reach 104° . The patient complained at this time of continual headache which became excruciating when he had a chill. The headache was generally limited to the left side of the head, though it would often become a general headache when severe. The patient became feeble, lost his appetite, looked haggard. Quinine intensified his pains and had to be discontinued. Antipyrine relieved him very little, though he was often forced to take it several times a day (10-grain powders).

About *June 5th* the rise of temperature became continuous,

ranging from 101° to 103° , but was very irregular. The headache persisted. During this time there was no distinct sensitiveness to percussion over the temporal bone or in other parts of the head, including the point behind the ear mentioned earlier in the history.

On *June 7th* the patient became delirious for about an hour. An ophthalmoscopic examination showed nothing pathological.

June 8th.—The patient was very low, had high fever and complained of intense pain. He was perfectly conscious, but had become very weak. His ear trouble had not shown any change; there was still a slight discharge which was very offensive, and which had been washed out daily. There was no oedema near the ear, no hardness or sensitiveness of the jugular vein. The pupils were contracted, but were equal and responded to light. Intracranial complications, which had long been suspected, were considered unquestionably present. Extensive caries, or a large collection of pus in the ear or in other parts of the temporal bone seemed almost to be excluded.

For reasons to be given below thrombosis was looked upon as improbable, and cerebral abscess as the more likely complication, and this was believed to be situated in the left temporal lobe. It was decided to make an attempt to find it by trephining and probing on the following day.

June 9th.—Patient's condition same. Felt numbness in the right hand for some time in the forenoon, which, however, passed off again. At half-past four in the afternoon the operation was begun. Drs. Geo. T. Preston, John W. Chambers, and my father, Dr. A. Friedenwald, assisted me. At this time the patient's temperature was 104° .

OPERATION.—The left side of the head was shaved, washed with soap and water, and bathed in a strong solution of bichloride. The instruments were disinfected in a carbolic-acid solution, and throughout the operation the antisepsis was carefully guarded. Chloroform was administered. For landmarks Von Bergmann's guidance was followed: From a point 4 *cm* behind the external auditory canal in a line made with the lower margin of the orbit, ascend perpendicularly for 5 *cm* to reach the point for trephining. An incision two and a half inches long, parallel with the basal line, was made, and on its middle a second perpendicular incision running upwards. A 1-*cm* trephine was used over the point mentioned above; the skull was very thick. Having released the button, the

dura mater protruded somewhat into the opening and pulsation was very easily perceptible. The dura was then opened and every part of the lobe was probed for the supposed abscess. The instrument used for this purpose was a somewhat pointed grooved-director, suggested by Dr. Chambers. At one time some cerebro-spinal fluid escaped, evidently from opening into the lateral ventricle, but no pus was found. Hemorrhage was slight. Seeing that there was no abscess here, we immediately decided to close the wound, dress it with iodoform (using strains of catgut for drainage), and cover the wound with collodion, and then to proceed to open the mastoid, with the intention of opening into the middle ear. An incision parallel with the posterior margin of the auricle and almost 1 cm from the latter was made. Upon cutting through the skin and periosteum and pushing it aside a circular opening was found in the surface of the mastoid process (about 1 cm in diameter). This opened into a large space which was entirely filled up with a white lamellated mass, which was recognized immediately as a cholesteatoma, and which was rapidly removed, and with it very foul-smelling pus, with a sharp spoon. In order to reach the inner parts with the spoon and with the finger it was necessary to enlarge the opening with a chisel. It was then evident that this cavity communicated freely with the external auditory canal. It was irrigated with a mild solution of carbolic acid. The wounds were sewed and an iodoform dressing was applied. The patient appeared to bear the operation well, recovered his perfect consciousness, and said that he felt much better than before. The temperature fell to 98.8° four hours after the operation, (Pupils small—1.5–2 mm). His condition was encouraging. The night was passed restlessly and

June 10th, he again complained of pain in the head. During the afternoon the temperature rose to 101° and the patient became delirious for a while. The pain in the head and ear increased. The patient was very talkative.

June 11th.—Temperature continued to rise till it reached 103° late in the afternoon; speech became rather heavy. The dressing of the mastoid wound was renewed.

June 12th.—Patient lapsed into unconsciousness about two in the morning. Does not speak and cannot be roused. Breathing stertorous. Temperature 102° . Death at 9.30 P.M.

I may mention here that the pulse was never much affected. During the early part of the treatment it varied from 75 to 85 ;

after the chills it rose to between 85 and 98; after the operation it was about 82 to 84. The post-mortem examination was made June 13, 1890, 7 A.M., by Dr. N. G. Keirle, from whose notes I quote the following: The opening in the bone (made by trephine, Fig. 1, *e*) corresponds to the lower posterior margin of temporal lobe at the termination of the fissure of Sylvius. A thin clot of



FIG. 1.—TEMPORAL BONE. INNER SIDE SEEN FROM BEHIND.



FIG. 2.—TEMPORAL BONE. ANTERIOR VIEW.

blood lines the inside of left side of the dura mater about 1 to 2 mm thick. A greenish layer of pus, covering the convex surface of left frontal and parietal lobes, seems to be situated in the pia mater. Some larger veins contain whitish material (pus?). The cerebral cortex does not seem to be softened, except at the posterior part of the left temporal lobe, where a round space about 1 cm in diameter and about the same depth is softened; this is just beneath the trephine opening, and here the dura mater presents an irregular opening. Sections of the entire brain reveal no abscess. In the temporal lobe there are a few fine red streaks marking the paths of the probe. The opening (about 1.5 cm in

diameter) at the base of the mastoid process externally (Fig. 1, *c*) communicates directly with the interior of the skull by a rough, irregularly circular aperture 1 cm in diameter (Fig. 1, *a*). The circumference borders immediately upon the lateral sinus (Fig. 1, *b*), in which a firm clot (?) can be felt; the dura is not opened at this point, but presents a thickened, rough, granular surface toward the aperture. When the sinus is slit up a white, firm mass is seen to occlude it, but not to adhere to its wall, which has a thin smear of soft, yellow mass (pus?). The white plug, measuring 12 mm by 3 mm, examined microscopically, exhibits somewhat ovoidal cells, some papilliform and concentrically laminated and stratified cells (cell-nest), also cholesterine crystals and fibrine.¹ The temporal bone was removed in great part (Figs. 1 and 2), and its subsequent examination shows, in addition to the points mentioned above, that it is only the uppermost portion of the mastoid that is affected, that this contains a large cavity, 2 cm deep, and extending forward between the external auditory canal (Fig. 2, *h*) and the base of the middle cranial fossa, the latter being converted into an exceedingly thin plate of bone (Fig. 2, *f*). Besides this the preparation shows that there is extensive caries behind and above the tympanic cavity (Figs. 1 and 2, *d*), the carious part joining the cavity of the mastoid process. Three polypi (Fig. 2, *g*) are seen attached to the upper outer wall of the tympanic cavity.

In looking over the history of the case, we are struck by the almost entire absence of any sign denoting mastoid affection. It is true that we noted early in the history that there was a spot of sensitiveness over the mastoid process, but this was slight, difficult to find and disappeared after the leeching. It returned for a short time about two weeks before the patient's death, but was hardly noticeable. It appeared insignificant, but the post-mortem examination showed that this spot coincided with the opening found on the external surface of the mastoid process. *Inflammatory swelling or redness of the skin covering the part, or swelling of the skin of the posterior and upper wall of the external auditory canal, which commonly indicate mastoid affection, were entirely absent.* This obscured the diagnosis thoroughly.

¹ I examined material from other parts of the sinus and found it likewise to contain cholesteatomatous masses consisting of typical epidermoid scales.

But there were other facts equally misleading. For *during the early part of the history we could never detect any fever!* And the apparent great improvement after the first month's treatment and lasting more than four weeks, during which the patient was free of pain, felt very well, and was able to work from early in the morning till late in the evening without discomfort, *was extremely deceptive* and made it appear improbable that the chills, which suddenly followed, were due to an extension of the ear trouble. The regular recurrence of the latter justified the suspicion and the hope that they were of malarial origin. Neither could be entertained long. Quinine given in large doses without any apparent effect soon established the fact that it was a septic and not a malarial fever, and, convinced by the lack of objective signs that its source was not in the temporal bone, we concluded that it was situated within the cranium. The probability of this being the case, as either septic meningitis, cerebral abscess, or thrombosis of a sinus, was carefully weighed. Meningitis was excluded, for its symptoms, such as delirium, dilatation of the pupils, optic neuritis, paralysis of the limbs, rigidity of the neck, slowing of pulse, etc., were wanting. It was difficult to come to a decision between cerebral abscess and thrombosis of a sinus. For while the repeated chills and high temperature pointed to the latter, we looked in vain for other symptoms of this affection. There was no swelling around or tenderness or hardness of the internal-jugular vein, or œdema about the mastoid, or exophthalmus, or optic neuritis, convulsions, delirium, metastases in other organs, or the like. On the other hand, it is well known that cerebral abscesses following suppurative processes in the ear commonly have their seat in the temporal lobe,¹ and abscesses in this part lack the presence of any localizing symptoms.² The conclusion was that abscess in the temporal lobe was the more probable and the operation made on the moribund patient was intended to relieve this.

The result has shown our conclusion respecting the form of intracranial disease to have been incorrect, but still it has

¹ According to Barr, quoted by Hartmann, 4th edition, p. 183, this was the seat in 55 cases of a total number of 76.

² Von Bergmann, "Chirurg. Behandl. v. Hirnkrankh.," p. 55.

shown that there was intracranial disease. This justifies our following the meagre signs of cerebral abscess and taking this only view that offered any hope of saving the patient's life.

It is highly probable that the beginning of the thrombosis occurred about four weeks before death took place, for it was then that the patient had his first chills. It is improbable that any operation performed during this time would have averted death. *The time when an operation would have proved successful was earlier, when the disease was still limited to the bone, but, as I have attempted to show, there was no evident indication for opening the mastoid process before pyæmic symptoms set in.*

There is one other point of interest to which I should call attention. Dr. Keirle discovered that cholesteatomatous masses were contained in the lateral sinus. This occurred without doubt by the direct extension of the growth through the ulcerated walls of the sinus into its interior.

A CASE OF LIVING LARVÆ IN THE EAR.

By W. E. BAXTER, M.D.,

SURGEON TO THE EASTERN MAINE EYE AND EAR INFIRMARY, BANGOR, ME.

Mr. T., American, age thirty-four, farmer, consulted me, July 27, 1888, stating that four days ago, while mowing, a fly crawled into his right ear. He removed the fly, dead, using a shaft of grass. There was no feeling of pain or discomfort until two nights after this, when the ear commenced to bleed, and, at the same time, an intense pain started, and both of these symptoms lasted until I relieved him two days later. While coming to my office "*three white worms*" dropped out of his ear.

When I saw the man he was nearly insane, both from the pain and from the fact that he thought that "his head was full of the worms." On inspection the auricle was found to be red and much swollen, the bandage that covered his ear was saturated with blood, and the meatus was seen to be full of squirming larvæ. I immediately syringed the ear with warm water, and by this means alone removed twelve larvæ. The auditory canal was abraded throughout its whole extent; the membrana tympani, although red, inflamed, and macerated, had not been perforated, but remained intact. After the removal of the larvæ, hearing distance, right, $\frac{5}{8}$; left, $\frac{3}{8}$. After placing a small pledget of cotton, saturated with boro-glyceride, in the auditory canal, the patient was sent to his home, being ordered to report on the next day. I did not see him again until at the end of a week, when the hearing was found to be normal in each ear, the abraded condition of the canal and membrana tympani to have disappeared, and the patient was discharged.

The larvæ averaged six *mm* in length and two *mm* in breadth, and, including the three that escaped from the ear before the

patient reached my office, numbered *fifteen* in all. They were of a yellowish-white color, and were filled with blood, that showed through the bodies. They were also remarkably active, remaining alive for over twelve hours in water, to which about three per cent. of chloroform had been added to test their vitality.

That the deposit of the eggs in the auditory canal was accidental is probable, as the man never had put any oil or other substances into his ear that would attract insects; also, as the fly was killed in removing, the eggs were doubtless pressed out of the fly at that time.

Dr. Roosa, in his "Treatise on the Ear," 1885, page 181, remarks: "Dr. Blake says . . . as yet they [larvæ] have always been found in connection with suppuration of the middle ear, with its consequent perforation of the membrana tympani." Also "Dr. Gruening reported, at a meeting of the New York Ophthalmological Society, in 1882, a case of living larvæ in the auditory canal when the tissues were sound, but his case is as yet unique in the literature, I believe."

Dr. C. H. Burnett, in "A Treatise on the Ear," 1884, page 291, mentions the case of "Dr. Kuntzmann, in which the ear attacked by the larvæ was entirely healthy before invaded by the fly which deposited the noxious egg." Dr. Burnett goes on to say: "From the investigations of Blake and others, it appears that, since maggots retain such firm hold upon the structures of the ear after they once get in there, syringing and instillations of fluids which would not injure the ear are insufficient to kill and dislodge such creatures. Blake, Gruber, and others are of the opinion that nothing short of actually seizing the maggots with suitable forceps, and pulling them out, will satisfactorily remove them from the ear." I had no such trouble in removing the larvæ in my case, the larvæ coming out by means of gentle syringing, and showing no power or inclination to retain a hold on the lining of the canal, notwithstanding the fact that they were very bloodthirsty and active.

OPERATIVE MEASURES FOR THE RELIEF OF IMPAIRED HEARING.

By DR. E. B. DENCH,

ASSISTANT-SURGEON NEW YORK EYE AND EAR INFIRMARY.

OPERATIVE measures for the relief of impaired hearing, the result either of suppurative or non-suppurative inflammation of the middle ear, have excited interest since the early days of otology. Politzer¹ suggests the division of adhesions, the result of suppurative inflammation, to allow the ossicular chain to move more freely, and to thus improve the hearing.

Kessel,² believing that fixation of the stapes was the cause of impaired hearing in one of his cases, performed the operation of "circumcision" of the stapes, or a division of its adhesions to the surrounding parts, as a means of mobilization.

Most of the later works upon otology cite such procedures more as matters of historical interest, than as methods to be employed in the treatment of diseased conditions of the tympanum. Moure,³ however, in writing upon the subject, shows that it has from time to time attracted considerable attention among otologists.

Perhaps the most exhaustive contribution upon this subject has been made by Miot,⁴ who has succeeded, in quite a number of instances, in mobilizing the stapes, thus improving the hearing, and reducing the distressing subjective noises. Blake, in an interesting paper before the Academy of Medi-

¹ "Diseases of the Ear," American edition, Philadelphia, 1883, p. 499.

² *Archiv für Ohrenheilk.*, vol. xi., p. 199.

³ *Revue de laryngol.*, vol. xi., p. 225.

⁴ *Ibid.*, p. 49.

cine of New York, in 1890, also cited a number of instances, occurring in his own practice, where operative measures in the middle ear had been followed by success.

My own experience in this line has been somewhat limited, and yet in such cases as have been operated upon, the results have been most satisfactory.

CASE I.—Was that of a young man, *æt.* twenty, who had suffered for several years with suppurative inflammation of the right middle ear. The posterior segment of the membrana tympani was largely destroyed, the malleus handle lying in the anterior remnant, and drawn well forward. There was considerable purulent discharge from the ear. The surface of the inner wall of the tympanum was covered with a tissue, almost fibrous in its density, and yet with a surface velvety and soft. Under appropriate treatment the discharge was much diminished, but the hearing did not improve; with the cessation of the discharge, however, the wall of the tympanum became less congested and thinner, and close inspection revealed, in the upper and posterior part of the cavity, the head of the stapes, apparently firmly fixed by the fibrous tissue before alluded to. Incisions were made in the dense mass about the head of the stapes in various directions, the idea being to liberate it from any adhesions, and permit it to vibrate freely. After the first operation, the hearing for conversation and for noises was much better, and subsequent operations improved it still further. The incisions also seemed to exert a beneficial influence upon the discharge, which has now ceased entirely, although for some time, a small quantity, apparently coming from the upper portion of the tympanic cavity, persisted. The improvement has been permanent, so far as I can judge, and has been noticed by the patient himself in his daily life. In fact, he says that he hears nearly as well as with his other ear.

CASE II.—Was a boy of twelve, who had suffered from chronic purulent otitis media, affecting both ears. When first seen, the hearing in the left ear, from which there was only slight discharge, was fairly good. The right ear was discharging freely, and the hearing was very poor, so poor that the patient had considerable difficulty in school. Under treatment, the discharge diminished, but the hearing did not improve. The right membrana tympani was largely destroyed. A perforation, occupying about two thirds of the entire membrane, exposed the upper and poste-

rior portion of the tympanic cavity to view ; the malleus was located in the anterior portion of the membrana remaining ; above, the border of the perforation covered the incudo-stapedial articulation. The edge was tense, apparently exerting considerable pressure upon the ossicular chain. A vertical incision was made through the edge, extending upward about $\frac{1}{8}$ of an inch. When the boy again reported, a few days later, the hearing was much improved, and the mother for the first time had noticed a decided change for the better in the hearing. The incision had relieved tension, as was evidenced by the fact, that by the separation of the edges of the wound, a good view could now be obtained of the stapedio-incudal articulation. At first it seemed advisable to divide this, but the improvement continued, and further operative procedure did not seem necessary.

CASE III.—Was a girl of sixteen, in whom suppurative otitis media at an early age had destroyed both membranæ. After the discharge had been controlled, the hearing still remaining poor, operative measures were undertaken to improve the hearing, and were successful. In the right ear, the malleus handle was found to be firmly bound down upon the promontory, and the ossicles were rigid. A delicate knife, curved on the flat, was introduced into the tympanic cavity, and the adhesion was divided ; the hearing for the watch immediately increased from contact, to two and one half inches. Three days later, the watch was heard at eight inches. The improvement has continued for two months, and although at present there has been a return of the discharge, the result of a cold, the patient states that the hearing is still better than before the operation.

CASE IV.—Was a young man of twenty, in whom an acute purulent inflammation had destroyed the entire membrana vibrans, leaving the tympanic cavity entirely exposed. The ossicles were notably displaced, and the tip of the malleus handle was drawn backward, upward, and inward toward the head of the stapes, to which it was attached by a firm adhesion. The division of this band, rendered the hearing of articulate speech in this ear practically normal.

A similar case is mentioned by Buck¹ ; also by Politzer.² Of course every case of impaired hearing due to suppura-

¹ "A Manual of Diseases of the Ear," N. Y., 1889, p. 287.

² Cited by Buck, *loc cit.*

tive inflammation in the middle ear, cannot be improved by operative interference. In none of the cases reported were the operations followed by inflammatory symptoms, and the pain in all was insignificant. It seems but just to our patients, therefore, in any case where there is a possibility of improvement by simple operative measures, not attended with risk, to give them the benefit of the doubt, after explaining that, in any given case, the amount of improvement is largely a matter of conjecture. In cases also, not dependent upon suppurative disease, but upon a catarrhal inflammation, with the formation of adhesions within the tympanic cavity, it seems that we are justified in opening the tympanic cavity, using antiseptic precautions, and to attempt to liberate the ossicular chain either by disarticulation of the incudo-stapedial articulation, or the division of existing adhesions, or by *brisement forcé* after the method of Miot.

Considerable work has been done in this direction by various otologists. Schwartze,¹ as early as 1873, excised the membrana tympani and malleus in a case of sclerosis of the tympanic mucous membrane; while, in 1878, Kessel² removed the membrana tympani, malleus, and incus, for the same pathological condition. In this country Sexton³ has operated upon many cases of chronic catarrhal otitis media, by removing the drum membrane and one or both of the larger ossicles, and the results have been most satisfactory.

In all cases, it is to be remembered that the adhesions are not limited to the atrium, but may be located entirely within the fornix tympani, and that improvement will only follow when these are divided. To Bryant⁴ we are much indebted for a clear description of these folds, as they exist in the tympanic cavity in a normal state, while Blake⁵ has pointed out their clinical significance, and the operative measures to be employed in their division.

¹ "Die Chirurgischen Krankheiten des Ohres," Stuttgart, 1885.

² *Archiv für Ohrenheilk.* Bd. xiii., p. 69.

³ "The Ear and Its Diseases," N. Y., 1888, p. 385.

⁴ *ARCHIVES OF OTOTOLOGY*, vol. xix., p. 217.

⁵ *Ibid.*, p. 209.

A BLOW UPON THE EAR FOLLOWED BY DEATH IN A WEEK.

BY TH. HEIMAN, OF WARSAW.

Translated by CHARLES H. MAY, M.D., New York.

THE following history, though it presents nothing especially remarkable in symptoms, course, and result, is published on account of its interest from a medico-legal stand-point.

J. P., a private in the infantry, twenty-one years old, came under observation in my division May 1st, suffering from hemorrhage from the left ear, which had lasted two days.

The patient was apathetic and very slow in answering questions, but the following previous history was obtained. He had been feeling weak and indisposed for several days, but not complaining of any thing special was ordered to do field-duty with the other soldiers. On account of general weakness he was less energetic than his comrades, and was punished by his officer, receiving a blow upon the left side of the face across the ear; this caused severe vertigo, almost causing him to fall and preventing a continuance of his work. He was sent to the regimental hospital, walking several kilometres to reach the latter. He had never suffered from pain in the ear before, though occasionally some pus had shown itself in the left ear. Severe hemorrhage from the left ear resulted from the blow; this bleeding had not ceased at the time of entrance into the hospital. These statements of the patient were not confirmed by the physician who preceded me in attendance nor by his assistant; the latter stated that there was no hemorrhage from the ear until forty hours after the blow—that is, but a few hours previous to his being transferred to my care.

I first saw the patient at eleven o'clock in the morning, shortly after his admission. He was tall, robust, well nourished, but somewhat anæmic. He lay upon his back. He answered questions somewhat indistinctly and unwillingly, and was apathetic; an unimportant dulness of intellect was also noticed. His tongue was dry and its motions seemed rather embarrassed in pronouncing words. His eyes seemed somewhat protruding; pupils equally contracted, responded to light. There seemed to be no pain or tenderness of the head, either general or circumscribed, either spontaneous or upon percussion. Skin and knee reflexes normal. Upper and lower extremities were free and active in their movements. Patient was able to sit up in bed and to move about the room; but in walking there was slight vertigo and nausea. Movements of the head were normal in every direction. Neither contractures, pareses, nor convulsive movements were observed in any part of the body. Temp. 40.5° C.; pulse 120, rapid and small. Recently dried blood was observed on the left auricle, and in the corresponding external canal a moderate quantity of bloody, purulent secretion. The drum-membrane was reddened and presented a small perforation in its anterior half, this opening appearing as a pulsating point. Inflation was rendered difficult on account of swelling of the Eustachian tube and of the middle ear. There was B. C. as well as A. C. for tuning-fork C on both sides. A. C. diminished on left side. Watch only heard on contact on left side. Right ear normal, functionally and anatomically. There was marked increase in the size of the spleen and tenderness over the region of the cæcum. The patient received 15 grains of calomel, an ice-bag was applied to his head, and the ear was washed out with 1:6000 sublimate solution and closed with iodoform gauze. I diagnosed the case as otitis media suppurativa, believing it to be complicated with a general infection. Possibly the aural trouble was independent of the general affection. Evening temp. 40° C.

May 2d.—A.M.: Temp. 39.4° , pulse 100. Patient felt better. Tongue dry and covered by a thick, brown layer. He had four involuntary fæcal movements. Vertigo had disappeared. Movement of the left eyeball diminished; paralysis of abducens of left eye. Moderate amount of purulent secretion from left ear. Patient complained of pain in left carpo-radial joint, though there were no objective signs to corroborate this. Quinine and muri-

atic acid were administered. A 3 P.M. the physician-in-chief of the hospital saw the patient and found him unconscious and delirious, and directed the patient's transfer to the internal medical division; during the balance of his illness the patient was treated conjointly by a therapist and by myself. P.M.: Temp. = 40° . Violent delirium during the night.

May 3d.—A.M.: Temp. 40.2° , pulse 120. Consciousness returned, although patient was still very apathetic. Left carpo-radial joint was swollen and painful. Involuntary discharges of urine and fæces. In other respects condition resembled that of the day before. Infusion of valerian was prescribed, and after shaving, corrosive-sublimate vaseline salve (2.0:32.0) was rubbed into the scalp. P.M.: Temp. = 40° .

May 4th.—A.M.: Temp. = 40.4° , pulse 100. Passed a sleepless night, delirious, escaping from bed. After questions were repeated several times, he answered unintelligently. Reflexes diminished. Left pupil dilated. P.M.: Temp. = 40.2° .

May 5th.—A.M.: Temp. = 40° , pulse 124. The discharge from ear ceased; drum-membrane is reddish-white and perforated. Head tender upon slight percussion. Ptosis of left upper eyelid. Face jaundiced. Tongue dry; mouth contains thick, offensive mucus. Distinct fluctuation in left radio-carpal joint. Continuous delirium. Patient remained in this condition until 6 A.M. on the following day, when he died.

The following changes were found at the *autopsy*: Jaundice. Pachymeningitis interna purulenta diffusa; numerous small subarachnoidal hemorrhages; hyperæmia of the substance of the brain and of its membranes; circumscribed basilar meningitis. A decolored (yellow) thrombus was found in the superior longitudinal sinus; dark-red ones were found in the transverse sinus and in the internal jugular vein. After removal of the temporal bone and of the dura mater adherent to its inner surface, three small openings were seen on the inner surface of the pyramid; these led to the tympanum. At this point the bony wall was very thin and transparent. After sawing through the pyramid along its outer wall, parallel to its upper margin, and continuing the section through the entire thickness of the mastoid portion of the temporal bone, it was noticed that the upper surface of the latter had become sclerosed so as to present a thickness of more than half a centimetre; in the sclerosed portion there were, at various points, small, softened areas containing pus and particles of bone.

The tympanum and the mastoid process were filled with thickened pus. Many of the lamellæ of the mastoid process had been destroyed, so that in certain places there were large cavities containing pus. Besides pus, pseudo-membranes and bands were also found in the middle ear; these bound down the ossicles and fixed them to the adjacent parts. The mucous membrane of the tympanum was ulcerated at certain places, in others it presented granulations. The portion of the tympanum which was next to the cavities just described contained nothing but air. Internal ear was not examined. After removal of the anterior bony wall of the external auditory canal the drum-membrane was exposed and presented a small perforation in its anterior half.

In addition, there were also found the following changes: Inflammation of the left radio-carpal joint; incipient, exudative, purulent pleuritis; metastatic infarction in the lower lobe of the right lung; parenchymatous hepatitis and nephritis; catarrhal enteritis, accompanied by a great many extravasations of blood into the mucous membrane.

This case presented many diagnostic difficulties at first; these were due partly to the character of the ear affection, partly to the complicating general disease. Examination of the ear showed the existence of an acute or of an exacerbation of a chronic inflammation of the middle ear, with perforation of the drum-membrane—symptoms which are usually present in non-traumatic cases. There was nothing to indicate traumatic etiology in this case except the blood upon the auricle (which did not prove any thing); there was also the statement of the patient, which was not entirely trustworthy. But, on the other hand, it could not be asserted that traumatism had not been an etiological factor. The patient stated that he had had no previous aural disease; therefore his affection must, in the absence of symptoms denoting chronicity, be regarded as an acute affection or as a chronic trouble which presented an exacerbation.

Independent of the cause and character of the aural disease there arose the question of the character of the general affection, and the relation which this bore to the aural trouble; this presented the chief difficulty originally. At first sight, the answer to this question seemed easy; the case

might be explained by supposing that a purulent inflammation of the middle ear had been produced by traumatism and had then resulted in septico-pyæmia terminating fatally. Although purulent inflammation of the middle ear following traumatism is not at all rare, and although such cases may be attended with serious and even fatal consequences, still it would be very extraordinary to have a case like the one we are considering, in which such pronounced and violent symptoms and manifestations of serious blood-poisoning developed as early as two days after the traumatism; I, at least, have not been able to find any mention of such a case in all the otological literature which I was able to consult. On this account I was very cautious in accepting the statements of the patient. Bearing these points in mind, and influenced by the general symptoms which the patient had when first examined and which he had had several days before, I diagnosticated the case at first as one of typhoid fever complicated by a purulent inflammation of the middle ear as a result of a blow upon the ear. But on the second day I found it necessary to change my original diagnosis on account of an absence of certain typhoid symptoms, the character of the fever, and the general condition of the patient, and to regard his affection as an infection, a septico-pyæmia, which was in direct relation to the aural disease; this view could but be strengthened by the swelling of the radio-carpal joint. Notwithstanding the assertions of the patient, I could not avoid thinking that the aural disease must have been a chronic one; the character of the secretion strengthened this view to a certain extent. The secretion was not pus mixed with blood, but the bloody purulent discharge which we find in caries of any part of the temporal bone. My diagnosis was confirmed by the autopsy, which indicated that the course of the disease had been the following: The case was one of an old caries of the left mastoid and walls of the tympanum, which had remained quiescent for a long time, but had been subjected to an exacerbation from some unknown cause, possibly through traumatism; unfavorable circumstances existing, this led to thrombophlebitis of the superior longitudinal sinus resulting in

septico-pyæmia. I am not certain about the exacerbation being the result of the traumatism, since the patient was not well and complained of general weakness before the blow was inflicted. I believe the influence of the traumatism was limited in this case to a hastening of the whole process in an individual who was affected with disease of the ear. The pathological changes found in the mastoid process and in the middle ear, as well as the condition of the patient before the traumatism, made a fatal termination sooner or later, and certainly before a very long period, probable, even without the traumatic influence.

It seems superfluous to add observations on the importance of the autopsy as affecting the medico-legal aspect of this case. Post-mortem examination demonstrated the real cause of death; it guarded us from false conclusions and saved a person from the charge of manslaughter.

The history of this case also demonstrates how little confidence can be placed in the statements of some patients, especially when they are interested, or when they are desirous of revenging themselves on a person who is supposed to have injured them or who really has done so. In our case, I believe the patient concealed his old trouble merely out of a feeling for revenge, even though the result cannot exclude the possibility of his really having been unaware of the existence of any aural affection; this can often be observed in old cases of aural disease which run their course without any very marked symptoms, especially among the less intelligent class of patients.

A RARE CASE OF AUDITORY REFLEXES.

Supplementary to the Case Reported in Vol. xviii., Nos. 3 and 4 of THESE ARCHIVES.

BY PROF. H. STEINBRÜGGE, GIESSEN.

Translated by CHARLES H. MAY, M.D., New York.

AFTER the report of the case alluded to in the title of this paper had been printed, I was informed through the kindness of Prof. Moss, that Prof. Erb had presented a case of respiratory spasms closely resembling my case, at a meeting of the Heidelberg Medical Society last winter. Investigation proved that this case was sufficiently interesting to be presented to the readers of these ARCHIVES as a supplement to the one I had reported ; the following history is a copy of the proceedings of said society relating to this case (vol. iv., part 2), for which I am indebted to Prof. Erb :

*Meeting of the Medical Section, Feb. 12, 1889 ; Prof. Erb.
Presentation of Patient : Curious Reflex Neurosis.*

"Man, forty-four years old, who has suffered from a very remarkable reflex spasmodic condition, involving the respiratory apparatus in particular ; this has lasted eight or nine years, during which time he was under observation and treatment at very many clinics. This spasm follows every sort of sensory, optical, and auditory impressions of a sudden character (sudden contact and pressure upon the skin, especially upon the abdomen ; rapid approach of the hand towards the eyes, clapping the hands, the ringing of a bell, the dropping of an object, the crack of a whip on the street—in short, after every unexpected noise of a moderate character) ; patient moves both legs in a kicking, spasmodic

manner, suddenly jumps up, and is seized immediately with a very remarkable respiratory spasm. This spasm consists of a series of *loud expirations* (through the nose) rapidly following each other, while the extended mouth is closed during each expiration, but opened, making a kissing sound during each inspiration. In addition there is presented a picture of labored respiratory movements affecting both chest and abdomen. The respiratory movements are at first very rapid ; their frequency and depth then diminish if there is no new irritative factor ; but any additional source of irritation will again increase these respiratory movements, and the attack may be prolonged for any desired period in this manner. The appearance of the patient during these attacks is a most curious one.

In other respects, the patient presents no abnormalities, excepting his gait, which is somewhat stiff, reminding one of ataxia, and the existence of impotence for a number of years. Vision, pupils, sensibility of the skin, smell, taste, muscular sense are all normal. Acuteness of hearing is good, rather diminished ; on both sides there is moderate galvanic hyperæsthesia of the auditory nerves with paradoxical reaction. Motion is normal everywhere. Skin and tendon reflexes are preserved and are not increased. Bladder and rectum normal. The diaphragm presents normal respiratory movements. All internal organs are normal, including pharynx and larynx. There are no real hysterical phenomena.

Besides the auditory apparatus, the portions of the body from which attacks emanate most readily are the skin of the abdomen, that of the soles of the feet, of the thighs, and of the genital region.

Prof. Erb diagnosticates the case as a functional neurosis, probably related to hysteria, consisting of an expiratory spasm associated with unusual movements of the mouth and lips, and induced by a reflex spasm in certain muscles of the thigh. It might be due to a circumscribed increase in irritability of certain (respiratory) centres of the medulla or also of the spinal column.

No information was obtained concerning the previous history and the etiology of the affection which would be of value in the consideration of pathogeny. All methods of treatment hitherto employed had been unsuccessful.

The history of this case is different from that observed by myself, in that the patient was affected by sudden noises

such as clapping of the hands, the crack of a whip, etc. In addition, Dr. A. Hoffman, now assistant in the clinic for internal diseases, at Heidelberg, was kind enough to inform me "that no examination has been made regarding the influence of musical tones."

As affecting the question of the existence of double perception-areas and double routes for tones and for noises, it would have been interesting had experiments in the production of spasms through musical tones resulted negative. Very likely the patient will appear at other clinics, and then possibly the experiment can be tried.

It is evident, however, that even though experiment showed that spasms could be excited by musical tones as well as by noises, the existence of double perception-areas and routes could not be assumed, since excessive irritation of centres might result in the production of both sensory impressions notwithstanding the existence of separate routes. Conclusive evidence of the existence of double perception-centres and double routes would be obtained by nothing short of the following crucial experiment: Spasms only produced by musical tones in the patient from Giessen, exclusively excited by noises in the Heidelberg case.

TWO NEW INSTRUMENTS.

I. PALATE-RETRACTOR. 2. RETRACTORS FOR KEEPING THE SOFT PARTS SEPARATED DURING THE OPERATION OF OPENING THE MASTOID PROCESS.¹

By AD. BARTH, OF BERLIN.

Translated by CHARLES H. MAY, M.D., New York.

(With two illustrations.)

THE two instruments which I am about to describe I can recommend as very useful, having tried them for several years. The first, the *palate-retractor* (Fig. 1), is



FIG. 1.

not new—it is a modification of those recommended by Krause and by Hartmann. It consists of a main portion bent into the shape of a hoop, on one end of which is a hook for the uvula and soft palate, and on the other an addition bent at right angles, through which a movable bar passes. Thus far the description corresponds to the palate-retractor of Krause. In Krause's instrument this movable bar is controlled by a screw, which mechanism consumes some time in applying the retractor, and again in removing it; in addition to this, on account of this screw motion, the plate which rests upon the upper lip must also be movable, and this also

¹ Presented at the meeting of North German aurists in Berlin, April 22, 1889.

diminishes the facility with which the instrument can be used. Probably the principal reason that Hartmann's palate-retractor has not become more popular is the fact that a portion has to be introduced into the nose in order to keep it in place—this is disagreeable to many patients; besides this the use of the instrument is attended with less cleanliness than when it can be fastened to the upper lip. The instrument which I present resembles Krause's, except that the movable bar does not work by a screw, but is simply pulled out and pushed in. A spring pressing upon the lower toothed surface holds the bar in any desired position; this spring is loosened by a slight pressure upon the button attached to its upper end. The plate attached to the inner end of the movable bar is attached firmly and bent so that in applying the instrument it will rest principally in the canine fossæ. I do not see any advantage in covering this plate with rubber; on the contrary, without any such covering it is much easier to keep clean. Of course, every one will prefer the instrument which he has become accustomed to. But even so, I believe that the palate-retractor in question is the most easily applied of all self-retaining instruments, and the most convenient for both physician and patient. These are the very points which decide the possibility of posterior rhinoscopy, and of operations in the naso-pharynx, under guidance of the eye, in many cases. I always cocaineize the naso-pharynx when applying the instrument; the toothed bar is drawn back completely and held in the right hand, the hook is pushed behind the uvula and upwards, and the whole instrument, and thus also the soft palate, is drawn forward; holding the vertical part of the instrument in the left hand and pressing upon the button found there, the plate is pushed ahead until it rests securely upon the upper lip. To remove the instrument, the left hand presses upon the button of the spring, and the toothed bar is withdrawn with the right; then the hook is pressed forward until it encounters the posterior pharyngeal wall; it is then rotated downward and withdrawn. I have had very few patients who have not tolerated this palate-retractor very well, even at the first attempt.

The second instrument consists of *retractors for separating the divided soft parts during the operation of chiselling open the mastoid process*. It consists of two bars, each provided with three sharp-pointed hooks; these bars are connected in such a manner by two rods and a screw, that when approximated the hooks form a single line.¹ (Fig. 2.)



FIG. 2.

After having divided the soft parts, including the periosteum, and having separated the latter from the bone, the hooks of the retractor are applied so that the points touch the bone at the spot where we wish to continue to operate. Then they are separated; the points of the hooks grasp the deeper soft parts, while the arms from which the hooks spring separate the more superficial soft parts and especially the divided integument, and push the auricle forward. When the instrument is in place and is being screwed up so that its two portions become separated, the soft parts are put upon the stretch and can be divided; in this way, for instance, the tendon of the sterno-mastoid can be divided more effectually. When completely separated, the space included between its two arms presents a clear field for operation. Before removing, the hooks must first be reapproximated. This instrument presents many advantages: In the first place, we can dispense with the services of an additional assistant to keep the margins of the wound apart with retractors; the instrument rests more quietly and the parts can be separated more effectively than when an assistant performs this duty; the wound can be kept cleaner, for when an assistant holds the retractors he is apt to grasp also the head and hair of the patient, and the latter often finds its way into the wound; hemorrhage from the

¹ The instrument is now made with the modification proposed by Truckenbrod—the middle hook is somewhat shorter than the one on each side of it.

soft parts is almost completely controlled by pressure of the instrument, so that even when this retractor is removed at the end of the operation, no ligaturing is necessary. These hooks are furnished in three lengths; the medium size is adapted for all cases where there is no special swelling of the soft parts; if there is much swelling the longest size should be employed. The instrument was made for me by D  tert, Franz  sische Strasse 53, Berlin.

THE ROUTE OF RESPIRED AIR THROUGH THE NOSE.

BY R. KAYSER, BRESLAU.

(With illustration.)

Translated by CHARLES H. MAY, M.D., New York.

I.

THE question of the direction of the stream of air through the nose in breathing, especially in inspiration, has been discussed for some time, chiefly by anatomists. Bidder,¹ H. Meyer,² Zuckerkandl,³ and others have endeavored to determine the direction of the stream of air through the nose by considering the anatomical structure of this organ; their results were not, however, uniform. In general, it was believed that in ordinary inspiration the air passed principally through the inferior and middle channels of the nose—especially through the inferior, since this was the shortest route to the naso-pharynx—that is, through the *pars respiratoria*; while the *pars olfactoria* was scarcely touched by the air in quiet respiration, and in snuffing in a manner not sufficiently understood.

To the best of my knowledge, E. Paulsen⁴ was the first to investigate this question experimentally. He "considered it almost impossible to draw any reasonably certain conclu-

¹ Wagner's "Handwörterbuch der Physiologie," art. "Riechen."

² "Lehrbuch der Anatomie," Leipzig, 1873.

³ "Normale und Pathologische Anatomie der Nasenhöhle," Wien, 1882.

⁴ Experimental Investigation of the Route of the Air through the Nasal Cavities, by Dr. E. Paulsen. *Sitzungsb. der K. Akad. der Wissensch.*, April Heft, Jahrg. 1882.

sion regarding the route of the respiratory air from a consideration of the structure of the nasal cavities," and he endeavors to ascertain this information by direct observation. Under Exner's guidance he began by placing pieces of red litmus paper in the nasal cavities of heads of cadavers, which had been preserved in alcohol, and which had been sawed in two previous to use, and then drew air through them from the trachea, having charged the stream with ammonia. Subsequently, at Hensen's advice, he improved upon this incomplete and inconvenient method by placing the head of the cadaver under a bell-jar within which were small sponges saturated with a one-per-cent. solution of osmic acid, and drawing this atmosphere laden with osmic acid through the nose. Both methods yielded essentially similar results: "In inspiration the bulk of the air takes an upward course, rises to the bridge of the nose, passes along the roof of the nasal cavities until it reaches the posterior portion, when it again descends along a curved route." The lower nasal passage is not touched by the current of air, and the "inferior border of the latter extends at no point beyond the middle of the lower turbinated body." The principal objection which can be brought against these experiments of Paulsen is that they were observed upon the cadaver, partly in alcohol preparations, and that on this account they are deficient and ignore the important erectile tissue of the nasal mucous membrane, especially of the turbinated bodies, in the living organ.

I have succeeded in doing away with this objection by a simple method, as easily applied upon the living as upon the cadaver. This method, which will be called in brief the "powder-experiment," consists in inspiring air laden with a fine powder and observing the route of the air by the view of the deposit of this powder within the nose. For this purpose I use powdered magnesia almost exclusively, on account of its lightness and insolubility. I filled a small sieve with this powder, held it in the neighborhood of the nose at about the height of the forehead, and produced clouds of magnesia dust by gently tapping upon the sieve whilst the person experimented upon inspired; or upon the

cadaver this dust was drawn in through the nose, from the trachea, by two Wolff's (aspiration) bottles—generally five litres in twenty to thirty seconds. Then the nasal cavities were illuminated and examined by a reflector and speculum, and in this way it was ascertained upon which parts magnesia had become deposited. I also tried Paulsen's experiments with osmic acid upon heads of cadavers, having tried the powder-experiment previous to sawing through the skull. In this way I demonstrated that the powder was really deposited upon the parts which had become stained brown the deepest, except that the powder did not seem to extend as high as did the osmic-acid discoloration—a result which is very easily comprehended. My method presents another advantage. Since the powdered magnesia can easily be brushed off and washed away after each experiment, the same head will answer for numerous experiments under different conditions, and these may be compared one with the other; the results upon the cadaver may also be compared with those upon the living, and *vice versa*.

If the powder-experiment be tried upon a fairly normal nose in the living, rhinoscopy will reveal the following surprising picture: A more or less dense layer of white powder is seen at the anterior extremity of the septum, about $1\frac{1}{2}$ cm from the point of the nose, at the level of the middle or upper portion of the inferior turbinated. Thence the white powder extends along the septum, describing a semicircle from before backward. The lower passage, the floor, and the lower border of the inferior turbinated body are entirely free from the powder; on the upper surface and the anterior extremity of the inferior turbinated body there are a few grains. The anterior vertical border of the middle turbinated body is thickly covered, also its lower border, and the lateral walls of the middle passage are well covered. Above the middle turbinated body, as far as it is possible to observe, there is powder, especially upon the septum. Posterior rhinoscopy shows some powder upon the upper part of the posterior pharyngeal wall; it is only with the production of very dense clouds of dust that, under normal circumstances, the deposit of powder upon the pos-

terior wall of the pharynx extends to the lower part opposite the lower nasal passage. There are, of course, modifications of this picture, depending upon the structure of the interior of the nose; it is observed only in cases of pretty straight septum and free passage in the upper part of the nose. If the upper part of the septum presents a marked convexity, the powder will not extend upward beyond this. The anterior end of the inferior turbinated body will present variations in the extent to which it is covered by the powder, these depending upon the amount of development. The powder-experiment shows the same result upon the cadaver, and corresponds with results of Paulsen's experiments with osmic acid already mentioned. Therefore I consider myself justified in asserting, considering also the nose in the living, that: *During inspiration in the normal nose, the bulk of the air passes along the septum, above the inferior turbinated body, describing a semicircle in its course; and extending upward nearly to the roof of the nose.*

II.

THE CAUSES OF THE ROUTE OF THE AIR THROUGH THE NOSE.

In estimating this question, I also made use of the experimental method, and I endeavored to ascertain what morphological relations of the nose determined the route which I had demonstrated.

Let us first consider the lower turbinated body, which is credited by many with considerable importance in determining this question. I sawed away the inferior turbinated body on the cadaver, and then experimented with the powder in the usual manner. The result was the deposit of powder in precisely the same manner as before the removal of this body; the experiment with osmic acid gave a similar result. This was corroborated upon the living. In advanced cases of atrophic rhinitis it is not rare to find that the entire inferior turbinated body has disappeared, or that only a slight ridge remains; if the powder-experiment be tried upon such patients, the powder will be found deposited

upon the middle turbinated body and upon the septum, in an arched manner upward, just as under normal conditions, and the lower passage, of extraordinary width, remains free from powder. If the inferior turbinated body be hypertrophied, especially at its anterior extremity, so that it projects markedly into the nasal cavity, a considerable quantity of powder will be deposited upon it. If access to the upper parts of the nose be interfered with by hypertrophy of the inferior turbinated body or, what is more common, by polypi which fill the middle nasal passage, these obstructing portions (hypertrophies or polypi) will show a very abundant deposit of powder, and there will also be considerable upon the lower part of the septum and upon the inferior turbinated body, almost to its border; but the floor of the nasal cavity will remain clear, except a little which has accidentally fallen there.

All this proves that, under normal conditions, the inferior turbinated body is no factor in determining the direction of the current of air—at any rate, that it is not the important factor claimed by many.¹ The septum is of consequence in regard to the direction of the current of air on account of the frequency with which deviations and outgrowths obstruct the passage. As is well known, the most frequent form of outgrowth is a larger or smaller comb-like spur (*crista septi*) from the lower part of the septum opposite or slightly below the level of the inferior turbinated body. Spurs of this sort have very little influence upon the direction of the current of air; in the powder-experiment the accumulation is found upon them, but extending no farther than when no such outgrowths existed. Not infrequently we find a convexity more or less flattened, in the upper part of the septum (*tuberculum septi*); occasionally this hides the middle-turbinated body and almost touches the outer wall of the nasal cavity. Such a convexity seems to limit the penetration of air upwards and in marked cases of *tuberculum septi* no powder can be demonstrated above the convexity.

¹ Bidder (*l. c.*, p. 922) says: "The current of air entering the nasal cavity and striking the inferior turbinated body is deviated from its original course, and divided, by that obstruction."

The external configuration of the nose, and especially the position of the nares, is of the greatest importance in determining the direction of the current of air. The anatomists already mentioned realized this factor, but did not give it sufficient importance. Thus H. Meyer¹ says: "The air which enters the nose first passes in a direction perpendicular to the plane of the nares; the continuing aspiratory movement also gives it a backward direction; so that its real direction must be the resultant of these two." But he soon loses sight of the importance of the position of the nares in the consideration of what he calls the "nasal dam." Direct experiment proves, on the contrary, the marked importance of the position of the nares. If, in the living subject, a short glass tube covered with india-rubber be introduced into one nostril so as to close it completely, and held there horizontal so that its anterior opening is perfectly vertical, the experimental deposit of powder will not extend above the middle nasal passage. The same result is produced in a somewhat less complete manner when the tip of the nose of the person experimented upon is raised so that the nares are almost vertical. Upon the cadaver, we can dissect the outer wall of the nose from the bridge almost to the nasal bones and turn out the flap made in this manner; then the air will pass through in a straight line, and in using the osmic acid or the powder there will be a coating corresponding to the size of the external opening. But even in these cases, the actual lower passage of the nose, *i. e.*, the space between the floor and the lower turbinated body remains free from deposit. The reason for this is that the inferior margin of the anterior nares is on a higher level than the floor of the cavity of the nose, and that the latter has a greater or lesser sagittal concavity in addition to the frontal; this has already been pointed out by Schwalbe² and Zuckerkandl.³ The extent of this sagittal excavation is best demonstrated by the use of the probe; if we introduce a probe into the inferior nasal passage, either in the living

¹ *L. c.*, p. 668.

² "Lehrbuch der Anatomie der Sinnesorgane," von G. Schwalbe, Erlangen, 1887, S. 63.

³ *L. c.*, S. 33.

subject or in the cadaver, we will find that it does not come in contact with the floor at all points, being separated by a distance of several millimetres at about the centre, and that the probe passes above the lower border of the inferior turbinated body, crossing the latter at about the level of its centre. This space, bounded above by the probe, represents an inactive area in the ventilation of the nose in inspiration—the air passing above it. The great importance of the horizontal position of the nares can also be demonstrated by a simple physical experiment. If the powder-experiment be applied to a horizontally placed cylindrical tube, the magnesia will be found over the entire inner surface, but if the anterior vertical opening be closed, and a lower horizontal one of equal size be utilized, the powder-experiment will show the lower half of the inner surface of the tube to be free from powder over its anterior half, whilst the great mass of the powder has coated the upper wall. In a plaster model of one half of the nose, the septum being of glass, the current of air through the nose was observed by placing a smoking object (a stick of wood, the anterior end of which was covered with velvet and kept lighted) in front of the anterior opening and then aspirating air through the plaster nose; the clouds of smoke were then seen to pass in an upwardly curved direction. If the tip of the nose be sawed off so that a vertical opening remains anteriorly, the smoke will pass directly backward in a horizontal course when the experiment is repeated.

III.

THE IMPORTANCE OF THE DIRECTION OF THE CURRENT OF AIR THROUGH THE NOSE TO THE SENSE OF SMELL.

If we accepted the views advanced by Bidder¹ and others, that in quiet respiration the air takes the shortest route, and consequently must pass along the floor of the inferior nasal passage, it would be puzzling to understand how olfactory impressions were produced during quiet breathing. H. Meyer² says: "The position of the organ of smell in

¹ Bidder, *l. c.*, S. 921.

² Meyer, *l. c.*, S. 318.

the nose is such that neither the inspired nor the expired air can come in direct contact with it during quiet respiration." Both authors believe that the direction of the current necessary for creating an olfactory sensation is brought about by an elevation of the alæ of the nose, a very insignificant motion, and one often entirely absent when there is a distinct olfactory impression, a factor, furthermore, which seemed to have no influence whatever upon the current of air in the experiments. The mystery regarding the appreciation of smell in quiet breathing is solved, however, by proof that even in breathing of this sort the current takes a route curved upward towards the *pars olfactoria*. *The general opinion that the current of air passes through the pars respiratoria is erroneous.* The division of the cavity of the nose into a *pars respiratoria* and a *pars olfactoria* is permissible anatomically, but not justifiable physiologically.

From what has already been stated, it appears that the anterior nares are of marked importance in influencing the perception of smell. In this connection I would call attention to the observation of Béclard mentioned by Zuckerkandl,¹ that "the absence of the external parts of the nose impairs or completely prevents the perception of smell, and that this loss or impairment is relieved by the formation of an artificial nose." The observations of Fick² are also explained: that air impregnated with odorous vapor is not perceived when encountering the posterior nares, but is readily perceived when carried to the anterior nares. In short, the current of air passing through the anterior nares forms a stream, convex above, which impinges upon the *pars olfactoria* the more readily the nearer the nares are to the bridge of the nose.

The value of snuffing in relation to the sense of smell also appears in a new light after these observations. Bidder and Meyer regarded the increase in size of the nares as the important factor in this act. My own belief is that in snuffing the following factors take part: "First, inspiration

¹ *L. c.*, S. 59.

² Mentioned in Hermann's "Handbuch der Physiologie," Bd. III., Th. 2: Geruchssinn von v. Vintschgau.

is accelerated; in this way a greater quantity of air, and hence also of odorous material, is carried into the nose within a given time. Second, the more forcible inspiration is interrupted at short intervals. A single long and very rapid inspiration does not increase olfactory perception; on the contrary, it diminishes it. The short inspiratory efforts keep the air in the nose and force it upward more than a continuous stream would; the different parts of the air composing the current are made to preserve their original upward direction for a longer period, and do not pass directly backward so soon. I have become convinced by direct experiments with the powder upon the cadaver, that with increased rapidity of current, the powder will be deposited higher if the aspiration is applied in an interrupted manner (by pressing the rubber tube together). Hence snuffing acts by keeping the air in contact with the *pars olfactoria*, dilatation of the nares being a factor only by increasing somewhat the quantity of the air.

Paulsen has demonstrated the same thing in reference to the expiratory current. I have not conducted any experiments in this direction. The correctness of Paulsen's observations is, I believe, assured even in the living, when we consider that in expiration also the current of air has a direction which is at right angles to that of the nares, passing upward at first, and then anteriorly in a curve. Finally Aronsohn¹ has demonstrated that the perception of smell during expiration is not as limited as was hitherto believed, just as his demonstrations disproved many other views of earlier authors.

IV.

THE SIGNIFICANCE OF THE STRUCTURE OF THE RESPIRATORY PART OF THE NOSE AS AFFECTING BREATHING IN GENERAL.

If the direction of the inspiratory stream upward and backward in a curved current be the normal one, then all

¹ Experimentelle Untersuchungen zur Physiologie des Geruchs. *Arch. f. Anat. u. Physiol.*, 1886, physiol. Abth.

changes in the interior of the nose which modify this direction must interfere with inspiration and cause a diminution in breathing—*i. e.*, with equal inspiratory force the quantity of inspired air will be decreased. On the other hand, all nasal changes which do not influence the normal direction of the current of air need have no restricting effect upon breathing. Hence it is chiefly obstructions in the upper part of the nose—above the inferior turbinated body—that need be considered in this connection. The inferior nasal passage may be very spacious, and yet there will be respiratory obstruction if the middle and upper passages become narrowed. The incoming air will first impinge upon the masses which fill its natural passage and then continue through the inferior channel. On the other hand, the lower passage may be completely obstructed without producing any interference with respiration. At any rate, it is quite certain that nasal stenoses differ in respect to their influence upon breathing.

This also corresponds to clinical experience on the subject. There are many patients complaining of difficulty in breathing in whom we are surprised to find a very small inferior turbinated body with a very roomy lower channel, whilst stenosis is found only in the middle and upper portions of the nose. On the other hand, we may find hypertrophies filling up the entire lower portion of the nasal cavity without producing any respiratory obstruction. Of course, if the inferior turbinated body is swollen to an extent to block up the middle passage and the entrance to the upper one, there will be difficulty in breathing.

In practice, estimation of these relations is rendered difficult by having to distinguish between actual objective obstruction of the nose and the subjective feeling of obstruction. The latter sensation always exists when parts of the nose which are normally free come together so as to touch without any real impediment to breathing having been produced. If, in a patient whose nose is obstructed in its upper part, we raise the tip of the nose so as to make the nares more vertical, the objective obstruction will become markedly less, but the subjective feeling of obstruction will persist. It is

curious that the majority of cases of nasal obstruction due to polypi affect the upper part of the nasal cavity—the natural channel for the air. The growth of these polypi is almost always towards the current of air, and thus they represent what might be called a certain “aërotropy.” If the magnesia-powder experiment be undertaken in a patient, the upper and middle passages of whose nose are blocked up by polypi, we will find these masses thickly covered with the powder—a demonstration of the fact that the current of air strikes up against them and is interrupted by them.

Similarly, an obstruction to breathing in the posterior portion of the nose and the naso-pharynx will result, when access to the posterior nares is interfered with, corresponding to the middle and upper nasal passages. Hypertrophy of the posterior end of the inferior turbinated body becomes important only when it extends some distance into the naso-pharynx, and when it has a certain amount of motion so as to be capable of closing the passage. It is only when we consider their effects upon the natural direction of the current of air that the significance of adenoid vegetations becomes manifest. These growths are present in the upper part of the naso-pharynx, and hence obstruct breathing even before they have attained any great size. As a matter of fact, we find very often that the removal of large quantities of adenoid vegetations does not relieve the impediment to breathing entirely if portions of even insignificant size have been left behind. This I had occasion to observe not long ago—a case occurring in a girl of thirteen, in whom such residues after the removal of adenoid vegetations had produced a continuance of the obstruction to breathing—but this was confined to the left side, corresponding to the situation of the adenoid residue.

There is no doubt that the upward direction of the current of air favors its supply of warmth and moisture; the route is made longer and narrower. Whether this course, as compared to a perfectly straight one, offers any appreciable advantages, my experience¹ has shown to be doubtful.

¹ Die Bedeutung der Nase, etc., für die Respiration, von Dr. R. Kayser. *Pflüger's Arch. f. d. ges. Physiol.*, Bd. xli., 1887.

THE SIGNIFICANCE OF THE DIRECTION OF THE CURRENT
OF AIR THROUGH THE NOSE IN ITS RELATION
TO THE REMOVAL OF DUST.

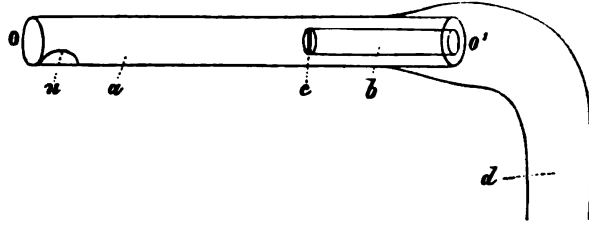
The capacity of the nose for removing admixtures of dust from the inspired air has been investigated a number of times recently; thus Aschenbrandt¹ investigated the subject first, then I followed,² and then E. Bloch.³ It was found that a large part of the dust in the air was retained in the nose; but, as Bloch and myself have demonstrated, this removal of dust was not complete. The value of these investigations is, however, lessened by the fact that they have been carried on under conditions very much at variance with those existing naturally. In all cases the current of air was conducted into the nose of one side by a glass tube introduced into the corresponding nostril, led across the posterior nares and then made to escape by the opposite nostril. In the powder-experiments, which form the basis for this article, the natural relations have been preserved, and on the cadaver it was possible to observe the course of the powder into the trachea. Thus it becomes possible to say which parts of the nose are responsible for the filtering qualities and which parts receive the deposit of dust. Bloch considered the physical properties of the nose in their relation to the retention of dust, and there can be no doubt that these are significant factors. It is also evident that narrowness and moisture in the nasal cavity are also of importance. But in addition, my experiments prove the significance of the direction of the current upon this question. The curved course in an upward direction materially increases the capacity of the nose for retaining dust. The influence of this factor can be demonstrated by a simple physical experiment. In order to show the dust which was carried along by a stream of air, I made use of a short rubber tube whose opening was partially closed by a strip of paper fastened across it; the strip of paper and the circumference of the small

¹ "Die Bedeutung der Nase für die Athmung," von Dr. T. Aschenbrandt, Würzburg, 1886.

² *L. c.*

³ *Physiological Investigations of Nasal Respiration*, by E. Bloch. No. 4, vol. xvii. of *THESE ARCHIVES*.

tube were blackened so that the deposit of powder could be demonstrated up these parts either by the naked eye or with the use of a lens. The accompanying schematic drawing gives an approximate illustration of such an experimental rubber tube placed within a larger glass tube.



a is the external glass tube; *b* the smaller rubber tube placed within the posterior end of *a*; *c* is the blackened strip of paper. Tube *a*, the level of the external opening of which is vertical, is connected with an aspiration-bottle by means of a rubber tube applied over the posterior opening *o'*; 5 litres of air are drawn through every 20 or 30 seconds, clouds of magnesia dust being produced in front of the opening *o*; the smaller internal tube is about 20 cm from *o*; there will be a very marked deposit of magnesia powder upon the strip of paper and upon the circumference of the extremity of this smaller tube *b*. If the opening *o* be then closed and a round opening *u* of similar size be made on the lower surface of the glass tube *a*, and the same experiment be repeated, the tube *b* will present considerably less deposit of powder, whilst a considerable quantity will be found upon the roof of tube *a* just behind the opening *u*.

In passing from the exterior to the windpipe, the current of air changes its course twice: first, when it enters the nose; and again, upon reaching the pharynx. In both of these situations, as a matter of fact, dust is deposited in considerable quantities. Beyond the trachea we find further interruptions in the course of the current of air at every subdivision of the bronchi. In this way the removal of particles of dust is favored, and the lengthy, narrow, and interrupted form of the respiratory tract represents a very important factor in guarding the lungs from the effects of

dust. These attributes serve to filter the air for the lungs just as they are of value in moistening and warming it (see my article mentioned above). If, on the cadaver, the trachea be connected with a glass tube, the extremity of which has been provided with one of the smaller experimental tubes already described, it will be surprising how very little of the magnesia powder will be deposited upon the small inner tube in conducting the powder-experiment. If flour be employed instead of magnesia no deposit whatever will be found upon the tube, provided, of course, the air has passed through the nose and trachea. It is obvious, therefore, that respiration of dust-laden air would have to be long continued in order to allow particles to reach the lungs. It must also be evident that the expired air which has been compelled to traverse the indirect route in an opposite direction, must be almost absolutely free from dust; this was demonstrated many years ago by Tyndall,¹ though Renk² claims having had different results after using more exact methods.

I have also investigated to what extent the filtering property of the nose is more complete than that of the mouth. I employed the powder-experiment on the cadaver in two ways: first, I closed the mouth effectually by stitches and plaster and conducted the air through the nose; and then I passed the air through the mouth, having occluded the nose. It was found that even when dust-laden air was passed through the mouth very little of this dust reached the trachea, especially if the mouth were kept half open so that the upper surface of the tongue approached very closely to the hard and soft palate; these surfaces then presented an abundant deposit. It is only when the mouth is widely open, and a great distance exists between the tongue and the roof of the mouth, so that the pharynx becomes visible, that much dust reaches the trachea, though considerable is deposited upon the walls of the pharynx. In all these experiments it was shown that with a slowing of aspiration the deposit of dust became more perfect. I found also, that,

¹ "Fragmente aus den Naturwissenschaften," von J. Tyndall, Braunschweig, 1874.

² Die Luft, von Dr. F. Renk. "Handbuch der Hygiene," I. Th., II. Abth., II. Heft., Leipzig, 1886.

whether the air passed through the nose or through the mouth, more dust reached the trachea when the head of the cadaver was placed horizontal than when in a vertical position corresponding to the erect posture. This may explain why special danger attaches to sleeping in an atmosphere rich in dust or laden with germs of infection.

In the description of the fundamental powder-experiment already given, it is stated that the powder is deposited in marked quantities in two situations in the nose: on the anterior, inferior portion of the septum, and on the anterior edge of the middle turbinated body. If we apply the results of the magnesia powder to the germs of infection, these two spots would seem specially exposed; as regards the septum, this is confirmed by the experience that perforations, especially those of non-specific, tuberculous nature, mostly affect the lower anterior portion of the septum.

In addition, it is worthy of note, that in ozæna, in the production of which the influence of external micro-organisms seems probable, we find that in recent cases, especially in children, in which the atrophy has not yet become marked nor the formation of crusts extensive, the first crusts are always and exclusively found upon the septum and the margin of the middle turbinated body. It certainly seems remarkable to me that the nose and the first portions of the respiratory tract, in which the carriers of infection contained in the air—especially tubercle bacilli, are first deposited, should be attacked so seldom by tuberculosis, especially of the primary form, and that in operative wounds suppuration, etc., is seen so seldom in these situations. Of course by the ciliary motion, discharge of secretions, and by reflex and voluntary cleansing, small foreign particles may easily be removed, especially from the nose; but whether these protective provisions are sufficient to explain the immunity of the nose and the beginning of the respiratory tract, seems doubtful to me and invites further investigation.

In conclusion I beg to express my thanks to Prof. Haase, director of the Anatomical Institute at Breslau, for his kindness in placing the heads of cadavers at my disposal, and for the interest which he showed in my investigations.

BONY GROWTHS IN THE MEATUS AND THEIR REMOVAL.

By URBAN PRITCHARD.

MUCH discussion has arisen not only in respect to the etiology but also as to the appropriate treatment of bony outgrowths of the external auditory meatus, and the difficulties and dangers of the operative methods at present in vogue have led many of us to hesitate before advising our patients to submit to surgical interference. In this communication I propose to indicate the plans which I have myself found most useful in dealing with the different varieties of these outgrowths, and more especially to point out a slight modification of the method of drilling, which appears to me to obviate many of the disadvantages under which the use of the drill at present labors.

The late Dr. Cassells, of Glasgow, introduced a primary broad classification of the bony outgrowths of the meatus. He divided such growths into hyperostoses and exostoses proper.

By hyperostosis we understand a diffuse enlargement of bony tissue, the result more particularly of chronic inflammation. This outgrowth usually presents itself in the shape of a comparatively large but uniform swelling of one side of the osseous wall of the meatus. It increases in size slowly (though more rapidly than true exostoses), and its growth may cease at almost any point, but very frequently it extends until the meatus is completely blocked, when it occasionally causes pain from pressure on the adjacent surfaces. Luckily such forms as this are very rare, and as they are but slightly denser than ordinary compact bone,

their removal is not so difficult as is the case with many of the exostoses proper, to which I am about to refer.

The exostoses proper may be grouped under three chief heads, viz. :

I. Multiple ; uniformly smooth and rounded ; pale and glistening on the surface ; even denser than ivory in consistence.

The etiology of these formations is obscure. Bathing, syphilis, and many other causes have been assigned for their appearance, but, as far as my own observations go, I am inclined to the belief that they are usually of gouty or perhaps rheumatic origin, more especially as they are seldom met with in hospital patients, but in the well-to-do and those suffering from gouty diathesis ; hence their occurrence varies a good deal with nationality, and hence also, perhaps, the reason why Englishmen are particularly prone to this disease. It must be admitted, too, that frequent bathing appears to act as an exciting cause.

In size they may vary from that of a millet seed to that of a split pea. Their growth is extremely slow, and it is but seldom that the meatus is found completely occluded by them, for directly opposing exostoses come in contact with one another their growth appears to be arrested. Thus a chink is always left which would be ample for ordinary hearing purposes, were it not frequently liable to become obstructed by the accumulation of débris (epidermic scales and cerumen), and hence it is that deafness is complained of.

II. Multiple ; irregular in shape ; of pale pinkish hue and dull appearance, with broad bases, and of great density.

For the most part, the origin of these may be traced directly to the irritative action of old-standing otorrhœa, or even to the actual ossification of polypi. They increase in size but slowly, though probably their growth is rather more rapid than those of the first class, especially as long as the otorrhœa remains unchecked, and hence they may occasionally be met with completely occluding the meatus—a condition, of course, of considerable and obvious gravity.

III. Single polypoid exostoses, consisting of a nucleus, so to speak, of ivory-like consistence, from the surface of which

trabeculæ of cancellated bone project into a layer of fibrous tissue, the whole being attached to the outer edge of the ossous meatus by a bony pedicle.

These would seem almost invariably to be the result of ossification occurring in a fibrous or fibro-cartilaginous tumor.

Though very rare, their tendency to comparatively rapid enlargement is an important element in considering their treatment.

There is usually but little difficulty in determining the nature of bony growths. At first sight they may be mistaken for simple polypi, but even this error is scarcely possible to the practised eye, and the use of the probe will quickly reveal their osseous character. It is, however, of importance that an accurate differential diagnosis of the several varieties should also be made, and we must therefore observe carefully the characteristics of the growths as described above; in addition, it may be noted that exostoses of the first and the second class are usually very tender when touched with the probe, while the surface of those of the third class is not only soft and yielding but almost insensitive.

It may be as well to mention incidentally that multiple exostoses (first and second varieties) are by no means confined to the meatus; they may occur in the bony walls of the middle ear, and, of course, may then seriously interfere with the functions of that portion of the apparatus, and produce irremediable deafness.

I have dwelt at some length upon the classification and differential diagnosis of these bodies, because the line of treatment to be adopted in each case varies considerably with the nature, position, and shape of the growth with which we are called upon to deal.

The question of treatment resolves itself mainly into one of operation, and we have to decide not only *when* surgical interference should be undertaken, but also *how* it can best be carried out.

Hyperostoses, on account chiefly of their size and their rapid and uniform growth, are usually not seen until suffi-

ciently large to block the meatus, when, of course, they should, except in rare instances, be removed at once.

Exostoses of the first variety ought, as a rule, to be left alone, the occasional removal of débris being all that is necessary. But if there is any tendency to complete occlusion, surgical interference is called for. An exception should be made in favor of those cases, with which we occasionally meet, where one of the growths is much larger and more prominent than the others, as there is then a tendency to continued growth and future occlusion. More especially should these latter be removed early if they are situated in the outer part of the osseous meatus.

In the second variety, as in the first, surgical interference is advisable under similar conditions—*i. e.*, when there is any danger of occlusion of the meatus, and in cases of single up-standing exostoses in the outer part of the passage. Not only so, but on account of the frequent presence of otorrhœa in these cases, occlusion is very liable to occur; for a very slight degree of obstruction may suffice to check or entirely to prevent the free flow of the discharge, and this is more especially the case on the recurrence of any inflammation. We must likewise remember that this otorrhœa is often but a sign of carious disease existing behind the exostosis, when, of course, an operation becomes imperative.

It follows, therefore, that the removal of this variety of outgrowth is far more frequently necessary than is the case with the first class.

Exostoses of the third variety should, as a rule, be removed at once, for the operation is, comparatively speaking, a trifling one, and there is therefore no necessity for delay by which, on the contrary, the difficulties of the operation may be increased.

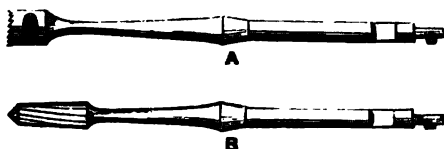
I now come to the consideration of the methods to be employed in the removal of these growths.

The chisel and hammer are occasionally very useful, but I think myself that they are chiefly applicable to cases of hyperostosis, when the bone is comparatively soft and the extent of surface to be attacked relatively large. The curve of the chisel or gouge employed should as far as possible be that of the external meatus.

Exostoses of the third variety, having a narrow base or pedicle, are easily removed by means of the dental elevator, or, as suggested by Mr. Field, they may be broken off with a pair of dental stump-forceps.

By far the most usual method of removing aural exostoses, especially those of the first and second class, is by means of a modified dental drill or burr ; this may be worked, as proposed by Sir William Dalby, by the electromotor, or, as is perhaps preferable, by the dental engine.

The burrs employed (Fig. B.) should be of fine temper and



A, Trephine ; B, Drill (medium), used for the removal of exostoses ; exact size.

very sharp, and rather longer in the shank than those used by dentists ; an assistant (if possible a dentist) should undertake the working of the motor.

If a single growth has to be removed, the drill should be applied as far away from the base and as near the apex as possible. Commencing with a very fine drill, when once the head has buried itself in the growth, we may exchange it for one of larger size, until at length the action is simply that of a rotatory file working in a furrow or groove. In some cases, the juxtaposition of two or more exostoses in itself forms a groove, in which the drill may be inserted, and the filing process commenced from the surface.

Recent improvements in the manufacture of burrs has, no doubt, greatly facilitated these operations, but in spite of this they are by no means easy, or to be undertaken lightly. They are frequently very tedious, and more than one sitting may be called for. This is partly due to the blood, which so quickly accumulates in the narrowed meatus, obstructing the view, and necessitating the frequent removal of the drill, and partly to the density of the growth itself ; on this latter account, too, the burrs are particularly liable to slip or run off the surface of the tumor, and, in fact, until the head of

the drill is well buried in the tissues we can never be certain that this will not occur.

By the following plan I think I have succeeded in obviating some of the difficulties attendant upon the use of the simple drill.

Instead of a solid burr, I have, in some of my more recent cases, made use of a minute trephine (Fig. A, p. 49) similar to those occasionally used by dentists. It differs from the ordinary surgical trephine not only in respect to its size, but also in the absence of the central peg or tooth. Various sizes can of course be made, the one represented being about 5 *mm* in diameter.

Substituting this instrument for the burr in the dental engine, the method of using it is simply as follows, viz.: As large a trephine as possible is selected, and it is applied as near the base as will permit the circumference of the instrument to rotate freely above the apex of the growth, so that at any one moment only a portion of the circumference of the trephine is in actual contact with the tumor; the object being to cut off a portion of the growth rather than to make a hole in it.

The cases in which this method is more distinctly applicable are those where one growth is decidedly more prominent than the others, and these are precisely the cases in which we are most frequently called upon to operate. On the other hand, when the object is simply to enlarge a pre-existing though narrow opening between several exostoses, the solid drill is to be preferred.

The advantages of the trephine over the drill seem to me to be:

1st. As a rule, only one sitting is necessary, for it will be at once perceived that to all intents and purposes this plan is merely a sawing through of the base of the tumor, and while this need take no longer than drilling a single hole, a far larger portion of bone is removed.

2d. There is much less trouble from the slipping or running of the instrument on the surface of the growth, and even if it does so, there is less risk to the meatus, as the trephine, unlike the drill, is perfectly smooth on the outside.

3d. No delay is caused by the change of instruments ; the same trephine will last throughout.

4th. Whereas with the drill nearly the whole growth has to be filed away or converted into débris, with the trephine there is obviously relatively less débris and therefore less need for removing and re-applying the instrument.

5th. For the same reason, there is less blood and therefore less obstruction to the view.

The results of these operations are as a rule highly satisfactory. As might be expected, large unhealthy granulations occasionally crop up at the edges of the injured surface, but these usually yield quite readily to the simplest treatment, and the wound heals satisfactorily. After removal of exostoses of the third variety, it will generally be found necessary, for the complete restoration of hearing, to syringe away a mass of epidermic scales, which will be found to have accumulated behind the growth. In this variety, too, I have occasionally observed that the pedicle arises from a cartilaginous surface, and this, to some extent at any rate, may account for the fact that they are exceedingly prone to recur, while the other bony outgrowths which I have described show little or no tendency to recurrence.

In conclusion, I may perhaps say a few words as to the use of anæsthetics in these cases. Many of these growths are exceedingly tender, and hence an anæsthetic is, for the patient's sake, absolutely necessary. Not only so, but as the slightest movement of the head may lead to most serious consequences, a general anæsthetic should be given in preference to such local applications as cocaine, for as the meatus is lined with skin and not mucous membrane, the mere application of this reagent has little or no effect, while the situation and extreme tenderness of the tumor forbid subcutaneous injections. The tenderness of the growth, too, appears to be almost completely limited to the outer surface, and, therefore, when once this tender region has been passed through the degree of anæsthesia need not be very profound, though I prefer myself to have the patient gently under its influence the whole time in case of undue movement or possible accident.

HISTOLOGICAL AND BACTERIAL INVESTIGATIONS OF MIDDLE-EAR DISEASE IN THE VARIOUS TYPES OF DIPHTHERIA.

*Read at the 62d meeting of the German Society of Naturalists and Physicians.
(With thirteen figures on Plates V. to XII.)*

BY PROF. MOOS, OF HEIDELBERG.

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THE question whether the primary and the so-called scarlatinal diphtheria are to be regarded as one and the same morbid process has of late been discussed anew, and as usual the most varying opinions have come to light. Fox is the most radical of all¹ in asserting that scarlatina, diphtheria, and tonsillitis are all one and the same morbid process, varying alone in the greater or less extensive propagation of the virus throughout the entire system. This view seems probable enough when we consider the percentage of the frequency of the secondary degenerative neuritis associated with these affections. This neuritis is most frequently observed after primary pharyngeal diphtheria. It has lately been denied as a sequel to scarlatinal diphtheria, but it has also as lately been observed by Seifert, and after angina, by Kast.² The latter cites at the end of his article the observations published forty years ago by French authorities concerning generalized paralyses after angina of non-diphtheritic origin. And Kurth³ discovered the streptococcus in four cases of tonsillitis.

¹ *Lancet*, 1886, July 31st.

² *Zbl. f. d. med. Wiss.*, 1889, No. 1, and *Deutsch. Archiv f. klin. Med.*, Band xl., p. 41.

³ *Berlin. med. Wochensh.*, 1889, No. 45.

On the other hand, many of our clinicians and pediatricists follow the leadership of Henoch¹ and accept the opinion that scarlatinal diphtheria is totally independent of the simple form of diphtheria. And Filatow has shown this in detail in the *Arch. f. Kinderkrankheiten*, 1887, p. 43. This topic has also been illuminated by a pathologist from another point of view: "The ear, according to Billington,² is never affected in genuine diphtheria, but only as a result of scarlatina. He regards the distinction as so marked that he considers it a differential diagnostic point. He was able to refer to its scarlatinal origin an otitis appearing with diphtheria." Roosa agrees with this opinion by saying that diphtheria with a scarlatinal origin is the only form in which otitis is observed, but later, in the etiology of acute middle-ear suppuration, he curiously separates the two types when he says that "scarlatina, diphtheria, croup, and so forth, here play an important rôle." Politzer also remarks ("Lehrbuch," 2te Auf., p. 324) that primary pharyngeal diphtheria is rarely connected with diseases of the ear.

It would thus seem as if Billington went too far, opposing pathological anatomy and clinical observation. All that we can say is that the primary pharyngeal diphtheria is *more rarely* complicated with diseases of the middle ear than scarlatinal diphtheria. Wreden saw³ eighteen cases of diphtheritic inflammation of the middle ear which occurred in scarlatina complicated with diphtheria of the naso-pharyngeal space. We must also insist that in scarlatinal diphtheria, too, the aural affection is often bilateral, whilst in primary diphtheria of the pharynx the ear disease is generally unilateral, and that Politzer's panotitis is very rare in primary pharyngeal diphtheria.

Personally I have seen but one case in thirty years. Further still, when the aural affection is unilateral, as in the scar-

¹ Henoch has lately resumed the investigation of this topic (*Berl. klin. Wochenschr.*, 1889, No. 43), after seeing 192 cases of diphtheria. Genuine diphtheria is totally different from scarlatinal diphtheria or scarlatinal necrosis. But the first may combine with scarlatina, in which case we subsequently see paralysis of the velum, which is absent in scarlatinal necrosis. Bacteriology, according to Henoch, cannot be trusted in the diagnosis here, because the Klebs-Loeffler diphtheria bacilli have not yet certainly been isolated.

² Roosa: "Diseases of the Ear," German edition, p. 154.

³ *Monatssch. f. Ohr.*, 1868, No. 10.

latinal form, the destruction is generally much more severe and the duration greater than in the primary. In reality though, the difference in frequency in the two affections is not so great as it seems. If I may be permitted to lay any stress upon the result of histological studies in several cases of this sort, I should say that a diphtheritic affection of the middle ear can persist a longer time without manifest symptoms, without suppuration, without perforation, and so forth. But the average duration in the fatal cases is only six days,¹ so that it happens that these cases are asserted not to have exhibited any ear disease.

The remarkable variations between scarlatinal otitis and that which originates after primary pharyngeal diphtheria led me to investigate histologically and bacteriologically the middle-ear alterations in the various forms of diphtheria, including the septic. At the same time I united therewith the investigation of the labyrinths affected, in order to verify and supplement my former papers on bacterial invasion of the labyrinth.

CASE 1. Septic Diphtheria.—E. G., a girl of five years; duration of attack, two days. Death after general constitutional toxic symptoms.

Anatomical Diagnosis.—Diphtheria of tonsils; croupous laryngo-tracheo-bronchitis; pneumonic infiltration of the left inferior lobe; fresh sero-hemorrhagic pleuritis, left side.

Right Temporal Bone: Meatus free; *Mt* dull; handle indistinct; tube open; periphery of *Mt* injected; the rest of the mucosa of the *entire* middle ear and ossicles dark red; dura in the petro-squamous fissure hyperæmic; Jacobson's anastomosis resembles a blue thread.

CASE 2. Primary Diphtheria of Pharynx and Larynx.—M. S., girl of five years. Duration, six days.

Anatomical Diagnosis.—Diphtheria; croupous tracheo-bronchitis; capillary bronchitis of left lobe; atelectasis of a portion of the lungs; fresh fibrinous double pleuritis.

Right Temporal Bone—Macroscopic Condition: Meatus filled with epithelium; *Mt*, serous infiltration; handle indistinct; tube

¹ Compare *Schmidt's Jahrb.*, ccxii., 1887.

injected; this condition extends to the periphery of the *Mt*, and then over the ossicles into the pneumatic spaces; the labyrinthine mucosa is also vividly injected as well as both fenestræ. Jacobson's anastomosis as in the previous case.

CASE 3. Primary Diphtheria of Left Tonsil.—Croup of upper and deeper air-passages. H. S., age three years, five months. Duration, eight days.

Anatomical Diagnosis.—Diphtheria of left tonsil; croupous laryngo-tracheo-bronchitis; broncho-pneumonia in right middle lobe; cheesy deposits in left upper and lower lobes; cheesy bronchial glands; ulcer of small intestines.

Right temporal bone: Meatus patent; *Mt*, serous infiltration; handle indistinct; mucosa of ossicles swollen; vessels of mucosa and labyrinthine wall engorged with blood, and a dirty coagulum in the jugular vein, an examination of which for micro-organisms had a negative result.

CASE 4.—Scarlatinal Diphtheria.—A. F., girl, age twenty-one months; scarlatina, naso-pharyngeal diphtheria, swelling of submaxillary glands; duration, five days.

Anatomical Diagnosis.—Scarlatina; diphtheritic inflammation with formation of pseudo-membranes in the naso-pharyngeal space and in the larynx, with partial necrosis of the mucosa; hyperæmia of lungs with enlargement of spleen, anæmia of kidneys, and moderate cerebral œdema.

Right temporal bone: Epithelial masses in meatus; *Mt* infiltrated, no perforation; tube normal; the entire mucosa injected, and thickened at the floor of tympanum.

Serum in the tympanum, engorged vessels in mucosa under the microscope, *to an extent that I have rarely observed, without the presence of a hemorrhagic extravasation.*

CASE 5.—Scarlatinal Diphtheria.—A girl of twenty-two months; the disease attacking mouth, lips, mucosa of cheek, tongue, and tonsils. Swelling of submaxillary glands. Duration, eighteen days.

Anatomical Diagnosis.—Scarlatina in the exfoliative stage; diphtheria with gangrene of tonsils; diphtheritic laryngitis; fibrinous perisplenitis, enlargement of spleen; numerous

embolisms of kidneys; acute gastro-enteritis; excessive hydrocephalus externus and internus, œdema of brain, and hemorrhagic pachymeningitis.

Left temporal bone: Meatus full of epithelium; *Mt* concave, greenish-yellow; tube, tympanum, and antrum filled with a mass of epithelium, blood corpuscles, and granular cells.

CASE 6.—Scarlatinal Diphtheria, with a Relapse.—S., a boy of seven, recovered from the first attack in six days, and was apparently well for eighteen days, when there was a relapse of DIPHTHERITIC TONSILLITIS AND PHARYNGITIS, with incarceration of the uvula between the swollen and diphtheritically coated tonsils.

Autopsy.—Acute parenchymatous nephritis; scirrhus of liver; hypertrophy and dilatation of heart; hydrothorax hydropericardium, and incipient pneumonia; anæmia of brain; ulceration of tonsils; enlargement of spleen; hemorrhage into stomach and intestinal catarrh.

Right temporal bone: *Mt* infiltrated; mucosa thickened; cartilaginous tube necrotic.

Résumé.

The six patients were from two to seven years of age; three suffered from primary pharyngeal diphtheria, one case being of the septic type, and three from scarlatinal diphtheria. The duration was from two to eighteen days.

The macroscopic alterations can be summed up as follows:

Meatus, patent or filled with exfoliated epithelium.

Mt was not perforated in a single case. It was usually infiltrated with serum and dull; light spot and ossicles indistinct. The mucosa of the *Mt* in half of the cases was normal, in the rest somewhat injected; whilst that of the middle ear was pale in two cases and extensively swollen in the rest, particularly at the floor of the tympanum, and on the labyrinthine wall. The same was observed in the mucosa of the pneumatic spaces, and the cells of the mastoid process.

The tympanum was twice found full of fluid containing epithelium and granular cells, and Jacobson's anastomosis as well as the dura mater extending into the tympanum were considerably injected.

The tubes were patent, or only closed at both orifices with mucus, but in one case necrosis of the cartilaginous portion was noticed.

The histological alterations of the middle ear were caused by *micro-organisms*; viz., *micrococci* and *streptococci*; within the blood-vessels, free, or enclosed in leucocytes, in the middle of the lumen or along the wall, single or in groups, nuclear and without nuclei, and occasionally in the juice-spaces of the connective tissue (Figs. 1 and 2). This condition was even noticed in a case that terminated fatally on the second day.

The histological alterations in the mucosa of the labyrinthine wall are difficult to describe in their infinite variety, but it is worth mentioning that those at the floor of the tympanum and at the labyrinthine wall and its niches were more extensive than near the ostium tympanicum. This is especially marked in the epithelium, which is much more frequently mortified here than in the direction of the tube. This result is due to the immigration of the micro-organisms into the epithelial cells. It is probable that the cocci which have reached the tympanum owing to the ciliary movements of the tube wander as far as its posterior section, where they remain clinging to the niches in the mucosa.

Whilst most of the epithelial alterations are due to cocci that have directly immigrated thither, other alterations must be referred to microbes that have entered *indirectly*, partly through the bottom of the mucosa after destroying the epithelium, and partly by those that have migrated indirectly from the pharynx into the lymph currents, thence into the blood-vessels, and thence into the stroma of the mucosa. When united, they produce a constant action *visible from the second day*. We see the vessels engorged with blood, necrotic here and there, from microbic action, and as a result a subsequent hemorrhage. In Figs. 4 and 5 we see also a

meshwork of fibrin, filled with leucocytes, migratory cells, and many nucleated cells.

Part of the latter are at a later date transformed into *clumps of granules*, part break up into *detritus*, part succumb to a *hyaline degeneration*, and a part, finally, yield to a *colloid metamorphosis*.

Additional Alterations in the Tympanic Mucosa.

The epithelium of the regions near the periphery of the *Mt* is occasionally found *unaltered*, and upon it we discover an extensive infiltration of migratory cells, which lie either directly on the epithelium or on a fibrinous network beyond the epithelium, containing a few migratory cells. This meshwork does not terminate where the infiltration with migratory cells begins, but extends to the margin of the infiltration. Its fibres are occasionally interspersed with cocci.

The extensive infiltration nowhere reveals any histological signs of an advancing process, nor any tendency to suppuration.

Owing to their *constancy* in primary pharyngeal diphtheria but not in the scarlatinal form I will emphasize this fact: that the niche of the round window is invariably filled with *giant granule cells* and groups of *circular cells* with a small central, rarely eccentric nucleus, and *an abundance of larger round cells* with numerous small round nuclei, resembling those mentioned by Bizzosero¹ from a diphtheritic deposit in the spleen.

The Formation of a Pseudo-Membrane on the Mucosa of the Labyrinthine Wall was seen but once, and then in a child that had died on the fifth day from scarlatinal diphtheria. The membrane was visible to the naked eye, as a deposit $\frac{1}{2}$ mm thick. The microscope showed that the mucous epithelium was destroyed. The pseudo-membrane lay upon a thick cellular infiltration of the mucosa, a product of the reactive inflammation which precedes its exfoliation. Its general appearance is well shown with all the varieties of its components at Fig. 6.²

¹ *Wiener med. Jahrb.*, 1876, p. 203.

² The pseudo-membrane was unfortunately destroyed by my lack of skill in carrying out Weigert's staining method, so that I can report nothing further concerning it.

Alterations on the Bony Labyrinthine Wall may become visible on the second day. First, in the shape of loss of periosteum, with its sequelæ, which may be regarded as an *indirect* result of the action of the bacilli; in other words, a disturbance of nutrition. Secondly, in a direct action upon the bone, destroying it by actually penetrating into the bone corpuscles (Figs. 1, 2, and 3). Thus do we find an explanation of the perforations inside the bony cochlear capsule, whilst the periosteum is intact. When, however, the periosteum is once destroyed the continued action of the bacteria can propagate the necrosis in the most varying directions, and, as Fig. 11 shows, even as far as the ligamentum spirale.

Alterations in the Intrinsic Muscles of the Ear.

After examining the stapedius and tensor tympani muscles for possible mycotic alterations, I concluded that the colloid and waxy degeneration which they exhibit is due to *thrombosis of the vessels* as well as to the *direct mycotic action* upon the contractile muscular substance. The thrombosis, with the consecutive necrosis of the muscular vessels that leads to numerous hemorrhages, is due to the transmigration of micro-organisms into the circulation, and is as much a disturbance of nutrition as the muscular degeneration of the tongue after ligation of the artery, or the total ligation of the organ itself. Now, just as in those experiments, so in diphtheria we find from the second day colloid and waxy degeneration of the muscular fibrillæ of the intrinsic muscles of the ear, and later granular degeneration with proliferation of the intra-fibrillar connective tissue. All of these various types may however be seen side by side (Figs. 9-12).

I have personally observed *direct mycotic alterations* from the presence of cocci in the periosteum of the stapedius canal, on the inside of the thrombosed muscular vessels, in the extravasated blood of the ruptured vessels, and in the muscular fibres themselves. Micro- as well as strepto-cocci are seen in the fibres that have already waxyly degenerated. The sarcolemma granules are rarely increased in number, whilst their nuclei are shrivelled, or greatly enlarged and

very fatty. The transformed muscular fibres are generally widened, and terminate in a club-shaped nodule, and the waxy masses finally coalesce with one another in an amorphous mass (Fig. 12).¹

Whenever an infectious disease like diphtheria terminates unfavorably we must recall to mind these possible alterations in the intrinsic muscles of the ear, because they may have unfortunate sequences, so far as the hearing of the patient is concerned.

Alterations in the Nerves of the Middle Ear.

The canaliculi of the petrous bones of children through which the nerves of the plexus tympanicus pass showed defects in ossification, *due to mycotic degeneration*. The micro-organisms having wandered hither partly from the periosteum of the nerve canals, partly from the tympanum, through the defective portions in Schwann's and the medullary sheath, multiply their nuclei, and thicken the endoneurium, and finally destroy the medulla and entire nerve fibres by the development of granular cells and margarine. This process is chiefly marked in the facial and auditory nerves, and I intend to return to this subject at no late date.

The Condition and the Alterations in the Eustachian Tubes.

These are due to micro-organisms from the mucosa of the pharynx, no matter whether the diphtheritic process has produced necrosis or not. The immigration happens in two ways: either *directly* through the pharyngeal orifice, or *indirectly*, the micro-organisms pass through the juice-spaces of the connective tissue and so reach those fibres which pass between the cartilaginous fissures of the inner cartilage to the submucosa of the tube, as I once saw in the case of relapse after apparent recovery of eighteen days. Here there was necrosis of the lower part of the tube, destruction down

¹ Prof. Moos here adds a long note from Oertel's "Pathogenese der epidemischen Diphtherie," the chief point of which is that in the peritonsillar tissue in diphtheria the most important alterations are found in the muscular tissue in the form of hyaline degeneration of the muscular fibres.—S.

to the cartilage, and partial destruction of the cartilage itself. I also saw in the same region a large accumulation of micrococci and streptococci, which had entered through the connective tissue which runs from the cartilage to the submucosa. When the migration is *direct*, the cocci attain the tubal epithelium, and mortify it, or they wander into the glands and their cells, which soon necrose.

When necrosis does not ensue we find hardly any alterations but an infiltration of the mucosa with small cells, just as in the migration of tubercle bacilli into the deeper air passages, where the upper ones remain free and simply form the passage for those bacilli that are penetrating deeper.

Just here we may recall the dispute between Habermann and Baumgarten, the former asserting that the tubercle bacilli reach the tympanum chiefly through the tube, the latter by a roundabout tour through the blood-vessels. But I should say that *both are right*, though the two morbid processes are not alike in a clinical aspect. Thus in tuberculosis there are numerous compulsory movements, which undoubtedly force many bacilli toward the tympanum, whilst in diphtheria the tubal muscles are often paralyzed, and any forcible urging onward of the bacilli is impossible. This is one of the reasons why, in diphtheria, when associated with velar paralysis, fewer bacteria are found in the middle ear than in tuberculosis. To prove that in diphtheria the micro- and strepto-cocci originate *alone from the vessels*, we may cite the facts:

(1) That we see them very often in the white blood corpuscles within the vessels.

(2) Also in the stroma of the mucosa, where the epithelium has been largely preserved.

(3) And finally we find spots where the entire mucosa is preserved, excepting the deepest periosteal layer, which has been destroyed, a process that can be referred alone to the periosteal vessels, and not at all to migratory micro-organisms.

The origin of the so-called primary-diphtheritic tympanic affections is somewhat similar. [No. 6 and 23 in the appended bibliography.]

The final question now is: *In what light are we to look at the middle-ear disease in these cases?* First, there is no suppuration¹ in the middle ear in five cases out of six, and even in the sixth the only suppuration was where the pseudo-membrane had rested. Hence the pus is not a part of an extended suppuration of the mucosa, but *only the product of a reactive inflammation* as on other mucous membranes, and additionally in purely croupous affections. *The affection is characterized by a partial mortification of the epithelium, an extensive infiltration of the mucosa with polymorphous migratory cells and retrograde metamorphosis, and finally by a necrosis of the blood-vessels and bone*, and all of this without the well-observed suppuration, as so often observed in primary and scarlatinal diphtheria with perforation of the *Mt*. The ultimate cause of these alterations has been recognized as *micro- and strepto-cocci*. Then too of a certain streptococcus, the *S. Endocarditidis*, we already know that it can produce necrosis without suppuration, and I have previously shown in cases of primary diphtheria that the streptococcus which wanders into the labyrinth can then and there excite extensive necrosis without a trace of suppuration.

Why it is, however, that in a large number of cases of middle-ear disease in primary pharyngeal,—though chiefly in scarlatinal diphtheria the well-known and often serious suppuration ensues, and why in others, as my observations show, there is no trace of the same, is still a matter of mere guesswork. The only thing sure is that the suppuration after scarlatina in the living often reveals the streptococcus either enclosed in cells or lying free between them.

Toward the end of the second week the streptococci begin to decrease in number; in the middle of the third week they are rarer, and basing my opinion on this condition, I was able to assert with confidence in a case of relapse of scarlatina after the sixteenth day, that the fever could not possibly be due to some complication arising from a suppressed otorrhœa.

¹ S. Hirsch, these ARCHIVES, vol. xix., p. 34, describes two cases of this sort with suppuration in the tube and tympanum, but the *Mt* was imperforate.

It is to be hoped that the future will enlighten us more on these points, and in the meanwhile the practitioner must not forget that even if the *Mt* is not perforated in diphtheria, serious alterations and even necrosis of the labyrinthine wall may nevertheless be present.

Historical Notes on Diphtheritic Bacteria.—I have already published my ideas¹ on the essential points in this respect in a paper on bacterial invasion of the labyrinth in diphtheria, where I stated that Loeffler had shown that there were but two sorts of diphtheritic bacteria demonstrable with our present staining methods—*micrococci forming chains*, and Klebs' *rods*, the former being *secondary* in their nature, whilst to Klebs' rods the essential significance in the disease itself was undoubtedly due.

Since then a large number of articles have appeared, of which I will now give a brief summary.

Loeffler² has demonstrated, in ten cases of genuine pharyngeal diphtheria, the constant presence of the rods in question. But he argues against its exclusiveness as a diphtheritic bacillus, because he additionally found "the diphtheria bacillus" in the mouth of a *healthy child*, and in diphtheritic membranes together with the diphtheria bacillus another that only differed from the former in its want of virulence in animals. Since then Hoffmann has proved³ that Loeffler's diphtheria bacillus is a frequent, nay, almost constant, inhabitant of the pharyngeal mucus, but further still that the difference in the pathological condition according to which the diphtheria bacillus is very virulent to animals and the pseudo-diphtheritic bacillus is quite harmless, is not constant. And more than that, Hoffmann cultivated from the pharyngeal mucus of patients with scarlatina and measles (though free from diphtheria), and also from patients with phthisis, bacilli which partly corresponded to the virulent and partly to the non-virulent cultures of Loeffler's "diphtheria bacilli."

As Hoffmann further observed that virulent cultures partly or wholly lost their virulence after four weeks when left to

¹ These ARCHIVES, vol. xvii., p. 1.

² *Centralbl. f. Bact. und Parasitenkunde*, ii., pp. 107 and 352.

³ *Wiener med. Wochens.*, 1888, Nos. 3 and 4.

themselves, we must either agree that the diphtheria bacillus and the pseudo-bacillus are of *one and the same species*, with certain variations in form and growth, and a spontaneous alteration between an infectious and a non-infectious state, or that, despite their resemblances, *they are too different organisms*. Any absolute decision is impossible. There is, however, considerable probability that they are *identical*, and thus resemble other bacilli which vary in virulence from maximum malignity to complete innocuousness. Finally, the identity is apparently demonstrated by the *spontaneous* loss of virulence.

Baumgarten is inclined to think, however, that the nature of the diphtheritic contagion has not yet been discovered, and rather believes, on the whole, that the streptococcus pyogenes carries the virus. For it is often discovered in large masses in the fibrinous membranes and diphtheritic infiltrations, and in other internal organs, even without the addition of other microbes, and not only within the diseased zones of the mucosa, but beyond and outside of them in the adjacent deeper and apparently still healthy tissues.

Roux and Yersin¹ discovered, in fifteen cases, the Klebs-Loeffler micro-organisms, with all their characteristics, except that the bacilli were more virulent than in Loeffler's experiments. One half of a cubic centimetre of bouillon-cultivation injected beneath the skin of rabbits, guinea-pigs, and doves was rapidly fatal (thirty-six to sixty hours) in every case. *Only a few hours after the injection were sufficient to demonstrate the bacilli in the organs, but at death the micro-organisms had totally disappeared from the tissue*, and yet the disease pursues its lethal course despite the disappearance of the organisms that excite it. Again, Loeffler failed to produce experimental diphtheritic paralysis, but Roux and Yersin were more successful, exciting, by their injections, paralysis of the extremities, etc.

Kolisko and Paltauf² discovered Loeffler's bacillus in fifty cases of diphtheria in patients as well as on the cadaver, and only failed to find them in the later stages of the disease. Huebner, in order to avoid mistakes, removed from the very

¹ Contribution à l'Étude de la Diphthérie, *Ann. de l'Institut Pasteur*, No. 12, p. 629.

² *Wiener klin. Wochenschr.*, 1889, No. 8.

locality of the disease at various stages and on various days the actual mucosa of the parts involved, and examined it with the greatest care. On the second day the loose exudate assumes the form of a croupous meshwork; on the third the thick croupous membrane is predominant; then we first meet with Loeffler's bacilli. On the next day the bacilli are still more abundant, and on the fifth day the mucosa has lost its epithelium. Kolisko also discovered the bacilli in croup, and for this reason regards diphtheria and croup as *etiologically* the same disease. *He did not find the bacilli in any cases of scarlatinal diphtheria.* The bacilli generally lie superficially; other forms, in chains, and grape-like, are deeper in the tissues. Kolisko's injections were not fatal, as like those of Roux and Yersin, but perhaps his cultivations were older. The fact that, even in sensitive animals, diphtheria is only a local disease, and that the animals die without exhibiting any extension of the disease to other organs, induced Kolisko and Paltauf to accept the theory that there is a diphtheritic virus, which, locally produced, acts on the whole organism, and especially perhaps on the vascular apparatus; a lesion of the mucosa is not indispensable. Genuine pharyngeal diphtheria and laryngeal croup are therefore a local infectious disease which lead on to intoxication, the occasional general infection being produced by the chain and grape-bunch cocci. The latter view may explain the absence of the specific diphtheritic bacillus in the cases which I examined.

The alterations in the middle ear in all of my six cases having been essentially alike, it seems as if they all alike must have been produced by the invasion of similar microorganisms. And so far as Baumgarten's views in regard to the importance of the Strept. Pyogen. as exciters of the diphtheritic invasion are concerned, it is well to observe that many of the histological conditions entirely coincide with those in primary diphtheria, the fibrinous meshwork on the intact mucous epithelium, the formation of a pseudo-membrane, etc.

Septic Diphtheria.

Having shown that in the various forms of diphtheria the condition of affairs bacterially and histologically in diphthe-

ritic middle-ear disease do not differ from one another, we must insist that septic diphtheria differs from the other forms *by the more extensive propagation of the micro-organisms, and by the greater intensity of the morbid process.* And if I additionally consider the condition of the labyrinth, the enormous number of micro-organisms is amazing. Hence, correspondingly, in the septic form the thrombosis, the vascular necrosis, and the hemorrhages are more numerous, as well as the rapid and radical destruction of the cellular elements, and of the tissues. Then there is the alteration in the periosteum, and the colloid degeneration, and even the total destruction of the bone by the action of the micro-organisms. Finally we have the disorganization within the bone, produced by the invasion of the Haversian canals and of the bone itself.

SUPPLEMENTARY BIBLIOGRAPHY, MOSTLY UNUSED IN THE PRECEDING ARTICLE.

1. DETSCHY (*Wiener med. Wochens.*, 1851, and cited in Urbantschitsch, "Lehrb.," 2 Aufl., p. 171) mentions a case of croupous inflammation of the tube.

2. WREDEN (*Monatssch. f. Ohrenhlkde.*, 2te Jahrg., No. 8) reports a diphtheritic membrane extending from the pharyngeal orifice to the isthmus.

3. WENDT (*Archiv f. Heilkde.*, Bd. xiii.) in five cases of croup and diphtheria in dead children saw nothing specific in the middle ear, the tube only once affected in croup and three times with suppurative inflammation.

4. SCHWARTZE (*Chirurg. Krankheiten d. Ohres.*, 1885) speaks only of suppurative catarrh of the tympanum in croup or diphtheria.

5. KUEPPER (*Arch. f. Ohrenhlkde.*, Bd. xi., p. 20) found one case of intact mucosa, in spite of extensive ulceration in pharynx and larynx, and one case of croup in the tube and tympanum also.

6. BURCKHARDT-MERIAN (*Volkmann's Sammlung*, No. 182) twice witnessed diphtheritic disease in the tympanum, although the tube was not attacked, and both were very painful.

7. KATZ (*Berl. klin. Wochens.*, 1884). The violent pain, delirium, and fever often observed in the second week of scarlatina are due to inflammation of the middle ear.

8 and 9. The same author (*Deutsch. med. Wochens.*, 1887, No. 48) has a paper on primary tympanic diphtheritis, and in the same magazine (October 1889, No. 41) a case of necrosis of the entire ear, and a second of necrosis of the middle ear and labyrinth, with streptococci in the tympanum.

10. STOCQUART (*Arch. f. Ohrenhlkde.*, Bd. xxii.) found in four cases of croup in children, under four years, pus in the tympanum, pseudo-membrane on the *Mt*, and once inflammation of the middle ear, with a pseudo-membrane on the ossicles and in the tube.

11. TRAUTMANN (*Arch. f. Ohrenhklde.*, Bd. xiv.) describes a severe case of pharyngeal diphtheritis associated with diphtheritic inflammation in the tympanum, and micrococci on the mucosa where deprived of epithelium.

12. LORING (*Amer. Jour. of Otol.*, vol. iii., p. 126) has an article entitled "A Case of Death from Croupous Inflammation of the Middle Ear, with Acute Leptomeningitis of the Convexity"; pseudo-membrane, 1 mm thick.

13. MOOS (these ARCHIVES, vol. i., p. 628). Sudden hemorrhage in right *Mt* during angina diphtheritica.

14. MOOS (these ARCHIVES, vol. v., p. 271). Histological alterations in the labyrinth during toxic diseases; panotitis after scarlatina; death.

14A. MOOS and STEINBRÜGGE (these ARCHIVES, vol. xii., p. 254). Histological condition of six temporal bones from three fatal diphtheritic cases. Only one perforation. Tympanum with mucus, pus, or pus and blood; infiltration of mucosa; similar alterations in antrum and tube.

15. BEZOLD (*Arch. f. Ohrenhklde.*, Bd. xxi.) describes the devastation due to scarlatinal otitis, with its disastrous effects on the hearing.

16. BLAU (*Deutsch. med. Wochensh.*, 1881, No. 49). Scarlatinal otitis, with a rare case of paralysis after pharyngeal scarlatina.

17. The same author describes (*Berlin. klin. Wochensh.*, 1881, No. 49) diphtheria of ear in scarlatinal disease, and a remarkable case of facial paralysis and diphtheria of both auricles.

18. VOSS (*Arch. f. Ohrenhklde.*, Bd. xxvi., p. 231) treats of the connection between albuminuria in scarlatina and middle-ear disease.

19 and 20. WOLF (these ARCHIVES, vol. x., p. 234) refers the cause of exfoliation to the ossicles in 28 patients (18 due to scarlatina) to the extension of the scarlatina to the middle ear, and in these ARCHIVES, vol. xiv., pp. 137 and 149, he reports labyrinthine disease and panotitis due to scarlatinal diphtheria.

21. POLITZER ("Lehrb.," 2te Aufl., p. 325) says it is going too far to refer most of the severe cases of middle-ear suppuration to diphtheria, for he has personally witnessed middle-ear suppuration after scarlatina without a trace of diphtheria.

22. The same author has described ("Lehrb.," 2te Aufl., p. 473) panotitis under similar circumstances.

23. GRUBER ("Lehrb.," 2te Aufl., p. 471) suggests that there can be tympanic participation in pharyngeal diphtheria without a tubal trouble, or even when the diphtheria has terminated. The diagnosis must then depend on the localized pain and the fever. It may also happen that the characteristic products are developed on the mucosa of the inner tympanic wall, without any perforation of the *Mt*.

24. HUEBNER (*Volkman's klin. Vortraege*, No. 422) speaks of the treatment of scarlatinal diphtheria.

25. SIEBENMANN (these ARCHIVES, Bd. xx.) found numerous micro-organisms in the tympanum of a patient with malignant scarlatina, but failed to find them in the fat, fresh diphtheritic membrane of a mastoid cell, and coincides with Huebner's view, that streptococcal development in the diphtheritic parts is due to subsequent migration from without (air and secretions), and therefore that it must be regarded as a secondary process, which has nothing to do with the etiology of diphtheria, but really signifies that septic infection has begun.

26. LEHNARTZ (*Jarb. f. Kinderheilkde.*, Bd. xxviii., p. 290) treats of the identity of the scarlatinal coccus with Fehleisen's erysipelas coccus. He has succeeded in inoculating mice with erysipelatos disease from the scarlatinal chain-coccus. He thinks that the identity is further proved by an observation of Huebner that an erysipelas was developed in Huebner's nostril by secretion coughed off from the throat of a scarlatinal child, and Huebner had never before had the erysipelas, or lately in any way come into contact with the same.

27. HOFFA, in speaking of the co-called surgical scarlatina (*Volkmann's Vortraege*, No. 292) asserts that he had cultivated from the blood of surgical scarlatinal patients streptococci which could not be distinguished from the Strept. Pyogen. and the Erysip. Cocci.

28. LEBER and WAGEMANN (*Graefe's Arch.*, Bd. xxxiv., p. 250) report a case of infantile necrosis of the conjunctiva, terminating fatally from multiple streptococcal invasion of the vessels.

29. BAUMGARTEN (*Jahresb. u. d. Fortschritte i. d. Lehre. v. Micro-organismen.*, 1887) argues in favor of the view that the strept. pyogen. excites the diphtheritic affection.

Explanation of the Figures.

Fig. 1, Plates v. and vi.¹ Posterior section of the mucosa of the labyrinthine wall. Section 16. Sagittal section from a mucous indentation on the labyrinthine wall, in septic diphtheria of two days' duration. Case 1, Hartnack $\frac{1}{8}$, tube drawn.

K = bony labyrinthine wall with the periosteum, all the rest is the deepest layer of the mucosa lying next to the periosteum. The bony frame-work of the labyrinthine wall is altered in so far as the bone corpuscles are collapsed, and their former presence here and there indicated only by dark, occasionally wavy, lines.

The mucosa contains round, oval, spindle-shaped, and nucleated cells, as well as red and white blood corpuscles; numerous blood-vessels, the largest of which alone contain leucocytes, with cocci enclosed; most of the cocci are in groups within the lumen, or singly; only a few in the leucocytes themselves; generally on the wall, on the point of emigrating. A few cocci lie outside the vessels, most of them in [emigrated?] cellular elements, and here or there in the juice-clefts (*SS*) of the connective tissue. Carbolated-fuchsin-alcohol preparation.

Fig. 2, Plates v. and vi. Sagittal section through a mucous pouch of the labyrinthine wall; series 65; crossing over from the posterior to the middle portion of the same case as Fig. 1; Hartnack $\frac{1}{8}$, tube dr. Carbolated fuchsin alcohol.

¹ The series of sections are made from the base to the summit of the petrous bone.

K = bone ; *P* = periosteum. All between the two bony portions is the pouch in the mucosa. We see blood-vessels partly necrosed, the emptied contents red, in the form of degenerated blood-vessels scattered over the mucosa. This exhibits, besides the connective-tissue fibres and corpuscles, cells of various forms and sizes enclosing streptococci, which lie also here and there free in the stroma and in the periosteum, which is degenerated. The upper layers of bone (to the left in the drawing) are already rarefied. The histological difference of the two bony parts (right and left) is very striking.

Fig. 3, Plates v. and vi. Sagittal section through the labyrinthine mucosa of the posterior segment of the tympanum in the preceding case ; series section No. 17, Hartnack $\frac{1}{4}$, tube dr.

Bone and the altered *deepest* layer of the mucosa. Amœboid cells of varying size and form, at one spot adjoining one another. Numerous cocci in the vessels, some enclosed, some free. Micro- and strepto-cocci are visible in the corroded bone, the stroma of which resembles connective tissue, poor in bone corpuscles, and most of these are altered and have lost their offshoots. A few cocci are visible inside the bone corpuscles, and the mucous stroma is thickened throughout, especially near the ragged bone.

Fig. 4, Plates vii. and viii. Sagittal section in posterior segment of labyrinthine wall, through the mucosa and adjoining bone. Scarlatina of five days' duration. Hartnack $\frac{1}{4}$, tube dr., Case 4.

A portion of the bone, *K K*, with the periosteum, *P*, and the deepest and middle layers of the mucosa, with vessels and mesh-work, and beneath, an infiltration with various cells, of whose shape, etc., fig. 5 will give an idea. *GL* = fissures in the connective. *C* = a colloid focus.

Fig. 5, Plates vii. and viii. Shows the spot marked with an arrow in Fig. 4, with Hartnack $\frac{1}{4}$, tube dr. Hæmatoxylin preparation.

Between the meshes of a fibrinous network, a few leucocytes, mostly polymorphous, and migratory cells resembling giant cells. At *dK* a direct nuclear segmentation.

Fig. 6, Plates ix. and x. From the former case ; Hartnack $\frac{1}{4}$, tube dr., series No. 28 (picrocarmine staining). Pseudo-membrane from the rear of the mucosa of the labyrinthine wall, resting chiefly on a cellular infiltration of the mucosa. We see an extensive network of fibrin enclosing leucocytes and migratory cells. At *dK* cell nuclear segmentation. At *nb* a necrobiotic focus, *nc* neoplastic capillaries. To the left and above *nc* a thicker layer of

fibrin nearly metamorphosed into fibrin. Here and there extravasations, and above from *dK* a smaller extravasation and numerous blood corpuscles.

Fig. 7, Plates vii. and viii. Section from sagittal section through mucosa of labyrinthine wall ; series No. 32, glycerine preparation, Hartnack $\frac{1}{2}$, tube dr. Primary diphtheria in a child of five years, Case 3.

Bone, *K*, with periosteum and mucosa ; numerous blood corpuscles ; in the middle a defect partly filled with colloid corpuscles, the latter covered or surrounded with blood corpuscles from the necrotic vessels.

Fig. 8, Plates ix. and x. Section from a sagittal section of the mucosa from the posterior and lowermost part of the labyrinthine wall between promontory and floor of tympanum. Hartnack $\frac{1}{2}$, tube out. Scarlatina five days' duration, Case 4.

The upper portion only retains its epithelium intact ; below, it is totally lost. Blood-vessels divided longitudinally and obliquely, tightly filled with blood. The mucosa above is transformed into a hyaline meshwork, beneath is thickened connective tissue without a trace of cells. Many leucocytes and vessels with thrombosis between the basal layer of the epithelium and the upper border of the hyalinized mucosa, with here and there round or oval cells as depicted and described in Fig. 5. Directly above the anterior portion of the hyalinized mucosa are small apertures a small empty vessel, and numerous blood corpuscles. All of the section below the vessel running lengthwise is evidently the result of general destruction of the cellular elements. There is a cellular infiltration between the vessels, and above the connective-tissue stroma of the mucosa occasional empty cellular envelopes. Far in front toward the margin we see an irregular defect, which, to the right and farther inward, is bordered by a portion of the thickened mucosa. Finally, on the margin turned downward, we see at the inner half of the field heaps of leucocytes.

Fig. 9, Plates vii. and viii. Sagittal section through the stapedius muscle of the same case ; Series No. 14, Hartnack $\frac{1}{2}$, tube dr. Glycerine preparation.

Some of the muscular fibres are normal, others, having lost their transverse striation, have a homogeneous, waxy look. Some fibrils show the various processes of alteration. A few sarcolemmatous nuclei, and at various spots proliferated intra-fibrillar connective tissue.

Fig. 10, Plates xi. and xii. Sagittal section through the semi-canal for tensor tympani and the muscle; Hartnack $\frac{3}{4}$, tube null. Primary diphtheria, duration six days, Case 2. Glycerine preparation. K = bone; p = external periosteum; I = inner lining, membrane of the bony canal.

The inner almost circular part represents the divided muscle, with its various alterations. The centre of the field is mostly occupied with the primitive muscular fibres now in colloid transformation. The adjacent dark portions contain the fibres partly waxy degenerated, and partly still normal.

The dark oblique lines (dI) are partly artificial, due to the microtome.

The spot marked with an arrow is shown again in Fig. 11, Plates ix. and x.; Hartnack $\frac{3}{4}$, tube drawn.

Fig. 11, Plates ix. and x. We see many striated fibres, with colloid and waxy degeneration, the latter with retained sarcolemma. At g a thrombosed, necrotic, small blood-vessel; at bg proliferated connective tissue.

Fig. 12, Plates xi. and xii. Section 134; glycerine preparation of previous case Hartnack $\frac{3}{4}$, tube dr. Colloid and waxy degeneration of the tensor tympani, some remnants of the sarcolemma cylinders, and formation of fissures by destruction and resorption of the muscular tissue.

Fig. 13, Plates xi. and xii. Sagittal section through a part of cochlear capsule, the ligamentum spirale, and the structures of the ductus cochlearis of the apex convolution; Hartnack $\frac{3}{4}$, tube drawn out; section not precisely perpendicular; glycerine preparation from previous case.

A portion of the bony framework of the cochlear capsule (SK) has necrosed. This process extends from the labyrinthine wall to the ligamentum spirale. Several defects in the bone with irregular cavities. The periosteal layer of the ligamentum spirale is partly raised above the bone. Large gaps running up and down between the outer periosteal layer and the middle looser connective-tissue layer, and due to destruction of tissue. Only about one half of the middle layer of the ligament is preserved. Additionally a part of the inner layer and of the radiating layer of the ligament, and of the crista basilaris, with their vessels, are destroyed. At ng is the only vessel preserved, and that is partly necrotic. The stria vascularis and the vas prominens are also lost. The vessels have necrosed and poured

out their contents into the ductus cochlearis, where we see red and white corpuscles and cells.

As a result of these alterations, the ligament has lost its characteristic semilunar shape. *et* = labium tympanicum of the crista, with traces of the epithelium of the sulcus and cellular necrotic elements. *n* = nerve fibres passing toward the capillary cells. Most of the nerve fibres beneath the labium are covered with a hemorrhagic exudation, consisting of red blood corpuscles and débris, which, extending along the basilaris propria and covering its tympanal layer, press it backward so that instead of being straight it is now concave and then convex. The inner supporting fibres and capillary cells are destroyed, with the exception of a trifling remainder (*vish*).

The inner pillar is defective in the centre. The head of the external pillar (*ap*) is altered into a cuplike structure, and its protoplasmic layer is lost. The inner half of the tunnel is filled with detritus, three structures of various forms, and an irregularly contoured cell with an eccentric nucleus. All of Corti's cells are preserved (*cs*), but without hair pencils. Some of them resemble hyaline.

There are traces of the phalanges and basal processes of Deiters' cells. Most of the middle portion has been destroyed, and a portion of the free space thus produced is filled with red corpuscles (*bk*) and detritus.

All but the last supporting cells are preserved. A cluster of red corpuscles near the first supporting cell has pressed inward the basal process of the last Deiters' cell.

The contour of the membrana reticularis is remarkably irregular, and on it are several round and oval cell structures. The outer half of the sulcus spiralis has lost its epithelium, and all that remains is elevated and projects into the ductus cochlearis.

Reissner's membrane (*mr*) is covered on the side turned toward the ductus cochlearis with an occasionally broad and an occasionally narrow layer of cells, most of which, like their endothelial and epithelial investitures, are in a state of decomposition.

ON THE LOCAL USE OF MENTHOL AND OIL OF EUCALYPTUS IN AFFECTIONS OF THE MIDDLE EAR.

BY DR. ADOLPH BRONNER, OF BRADFORD.

(With one woodcut in the text.)

A paper read before the Otological Section of the Society of Naturalists and Physicians at Heidelberg, September, 1889.

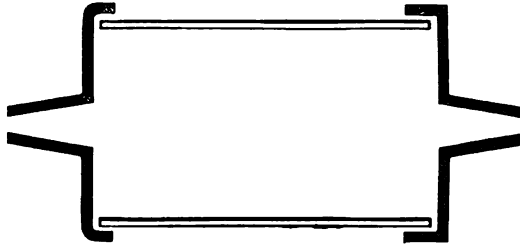
THE very favorable results obtained by Rosenberg and others with the use of menthol in the treatment of the diseases of the neck and pharynx induced me to try it in affections of the Eustachian tube and middle ear.

During the last year I have treated many cases, and a large percentage of these with apparent success. The most favorable cases seem to be those of chronic swelling of the mucosa, whilst in the initial stages of some cases of sclerosis I was inclined to think that I had been able to prevent the encroachments of the disease.

I will not, however, venture here to burden you with clinical reports and figures, but I should like to describe in brief the manner in which I use the menthol.

When the mucosa is greatly swollen, I direct the use of a snuff of boric acid with two per cent. of menthol to be frequently used in small quantities, while at the same time I inflate the middle ear with the catheter and menthol vapor. A few drops of a twenty per cent. solution of menthol in olive oil is poured into an antiseptic capsule, and this is then firmly fastened to the catheter. The capsule which I use resembles Hartmann's, only the glass tube is straight and not bulging. The capsule is then filled with pumice stone instead of cotton, and onto this the

liquid is poured. I generally use Lucae's modification of Politzer's bag, which consists of a double bag, that can be attached to the operator's coat. The capsule is then passed into the rubber tube between the hook and the bag.



The menthol vapor is slowly inflated into the tube for the space of a minute or two, and when the tube is obstructed by swelling of the mucosa at the orifice, it is interesting to watch with the otoscope how the passage gradually becomes more and more patent from the action of the menthol until finally the air rushes in with full force.

In case a bougie is needed, I dip the end of it into menthol oil, and let it remain a short time in the orifice of the tube before I urge it farther onward.

If the mucosa of the middle ear is excessively affected, especially in cases of sclerosis, I use in addition to the menthol the oil of eucalyptus poured similarly upon the pumice stone. The inflation is then continued about the same as before.

I lay great stress upon the *prolonged use* of the vapors upon the diseased mucosa, and I think that I can especially refer to this method the favorable results that I have obtained.

I do not remember to have produced any pain or inflammation from this procedure, and on the contrary I think that by the use of the menthol I have been able to relieve the slight occasional pain.

The menthol does not seem to be of any particular value in chronic otorrhœa.

I have used it considerably in cases of furunculosis of the meatus externus, but I am unable to testify to its advantages as extolled by Cholewa in this disagreeable affection.

In conclusion, I will call attention to the danger which we run in inflating the middle ear with impure air. There must be innumerable cases in which the excitors of inflammation have been

carried into the middle ear, and a simple catarrhal inflammation thus transformed into a purulent. Whether the micro-organisms in question are destroyed or hindered in their development by the menthol or eucalyptus I am quite unable to tell, because I made no culture experiments. But since I have employed menthol (and have treated a large number of cases) I have not seen a single case in which suppuration or pain were present after or during the treatment. But when I used unpurified air many cases of this sort were observed.

I will additionally suggest that lately, for the sake of greater security, I have added a second capsule filled with dry cotton and attached to the bag, and that by frequently changing the cotton I hope to prevent still more accurately the penetration of micro-organisms into the middle ear.

REPORT ON THE PROGRESS OF OTOLOGY DURING THE SECOND HALF OF THE YEAR 1889.

By A. HARTMANN, BERLIN.

Translated by Dr. MAX TOEPLITZ, New York.

III.—PATHOLOGY AND THERAPEUTICS.

GENERAL LITERATURE.

1. Prof. K. BÜRKNER. Report on the cases observed during the year 1888 to 1889 at the polyclinic for aural diseases at Göttingen. *Arch. f. Ohrenheilk.*, vol. xxviii., p. 263.

2. Dr. VALENTIN. Hearing faculty of fever patients and diagnosis of unilateral deafness. *Schweizer Correspondenzbl.*, 1889, No. 18.

3. Prof. Dr. KIESSELBACH. The action of cocainum muriaticum upon the ear. *Monatsschr. f. Ohrenheilk.*, etc., 1889, No. 9.

1. The number of patients treated during the time mentioned in the report at the polyclinic at Göttingen was 1,281. The following modern remedies were tried : a. Aluminium acetico-tartricum Athenstædt. BÜRKNER considers the drug to be extremely well adapted for the treatment of rhinitis hypertrophica and of all chronic nasal swellings. A five to ten per cent. solution of borated glycerin, however, has proven to be much more reliable. b. The disadvantages of creoline for the treatment of aural diseases preponderate over its advantages. c. The action of herba sabinæ together with alumen ustum for treatment after removal of polypi is not equal to cauterization with lapis.

2. VALENTIN has found that, with the rising of the temperature a diminution of the hearing power is invariably associated without perceptible lesion of the ear ; the decrease is in direct proportion with the increase of temperature. It was very distinct

in typhoid fever, rheumatism, wound fever, and tuberculosis. In hectic fevers of convalescents from typhoid fever and in tuberculosis the hearing is better during the remittent stage than during the fever. Chinin produces almost invariably hardness of hearing ; salicylic acid, rarely.

Valentin, for exposing simulation of unilateral deafness, recommends the following procedure. He introduces tubes into both ears and brings a watch or a tuning-fork close to the end of the tube placed into the deaf ear behind the back of the patient, whereupon the malingerer will assert not to hear. The mouth of the second tube is then gradually brought nearer to the watch. In case of real deafness the person to be examined shall now hear at a distance of several inches.

3. KIESSELBACH in a preliminary communication reports the successful treatment of tinnitus and vertigo by means of injections with cocain. muriat. into the middle ear (*per tubam*). Every three to five days five to ten drops of a four-per-cent. solution were injected, which was gradually increased to ten per cent. In fresh cases Kiesselbach effected an immediate recovery by means of a single injection. He explains the effect through decrease of the arterial pressure by medium doses of cocaine.

INSTRUMENTS AND METHODS OF EXAMINATION.

4. L. LICHTWITZ, Bordeaux. The use of the new Edison's phonograph as general acoumeter. *Prager med. Wochenschr.*, 1889, No. 47.

5. C. KATZ, Berlin. Artificial drum membrane made of celloidine. *Deutsche med. Wochenschr.*, 1889, No. 28.

4. LICHTWITZ discusses the requirements of the acoumeter for the voice, and holds that they are for the most part fulfilled by Edison's phonograph, which is thought to represent a constant source of sound. This seems, however, not to be the case, for whenever the apparatus is set for the reproduction of spoken words from the same tube, different intensities are caused, since the connection does not always take place in exactly the same manner. The author's views are based merely upon theoretical considerations without experiments of his own with the phonograph.

5. KATZ recommends an artificial drum membrane made of celloidine. The prescription is as follows : pour into a flat watch-

glass about $1\frac{1}{2}$ millimetres above its floor a solution of celloidine (celloidine 10.0, spiritus absol. and æther \overline{aa} 50.0) and let it evaporate. A completely transparent, light, extremely thin, and elastic disc remains, from which the artificial drum membrane can be made. A cotton pellet, imbued on one end with the solution of celloidine, may be firmly attached to the centre. These drum membranes may be preserved in a forty per cent. solution of alcohol.

EXTERNAL EAR.

6. ANTON WILH. and LZENES LIGISM, Budapest. Some remarks upon the treatment of otitis externa circumscripta. Furunculosis. *Prager med. Wochenschr.*, 1889, No. 33.

7. KESSEL, Prof. Jena. Exostoses of the external meatus. *Corresp.-Blätter des allgem. ärztlichen Vereins in Thüringen*, 1889, No. 7.

8. KRAUS (Rzeschow). Annual report of the surgical department of Dr. Jablowski, surgeon-in-chief. *Przegląd lekarski*, 1889, No. 36.

6. ANTON and LZENES report their experiments upon the treatment of aural furuncles with menthol oil. They resulted in the fact that menthol cannot retard the formation of furuncles, prevent relapses, and cut short the course of the affection. Menthol relieves the pain in many instances, but its burning action is frequently too prominent.

7. KESSEL gives a full description of the exostoses and reports five cases operated by himself. He uses hollow but also wedge-shaped chisels, those with slanting edges and checking devices. The latter are used when the bone to be removed is extremely thin and the drum membrane very close to it. Then he uses the angular chisel instead of the straight one, which permits a better survey of the field of operation.

8. From Kraus' report the following case is worthy of mention. A cherry-stone was in an infant wedged in the bottom of the external meatus. All well-known methods of mechanical extraction were of no avail. The cartilaginous portion of the external meatus was detached under anæsthesia and the foreign body was removed by means of Daviel's spoon. SREBERNY (Warsaw).

MIDDLE EAR.

9. EICHBAUM, W. The importance of perforations of the drum membrane for recruitment. *Deutsche militärärztl. Zeitschr.*, 1889, No. 12.

10. GOMPERZ, B. Three cases of spontaneous shrinking of aural polypi. *Monatsschr. f. Ohrenheilk.*, etc., 1889, No. 7.

11. LEVY, M. Primary external osteoperiostitis of the mastoid process, and primary purulent inflammation of the mastoid cells. *Gazette hebdom. de medic. et de chirurg.*, 1889.

12. JACOBY, L., Breslau. Clinical contributions to the operative treatment of caries of the temporal bone (22 chisel operations in 20 patients). *Arch. f. Ohrenheilk.*, vols. xxviii. and xxix.

13. COLLIER, New York. Thirteen cases of chronic purulent otitis media treated by excision of the ossicles, with remarks. *Deutsche med. Wochenschr.*, 1889, No. 28.

14. KOEBEL, Stuttgart. Case of caries of the tympanic and mastoid cavities. *Med. Correspond.-Blatt. von Württemberg*, 1889.

15. E. WEIL, Stuttgart. A case of necrosis of the labyrinth. *Med. Correspond.-Blatt. von Württemberg*, 1889.

16. KOERNER, OTTO, Frankfort-on-Maine. Statistical contributions to the knowledge of the cerebral abscess consequent upon aural disease. *Arch. f. Ohrenheilk.*, vol. xxix., p. 15.

9. The present ordination : " Grave aural affections, which are difficult to cure, unfit for military service," gives full play to the physician. Eichbaum, for the critical examination of perforations of drum membrane, lays down the following maxims : 1. Acute perforative purulent otitis media ought to be treated from two to three weeks. In case of no marked improvement or recovery : dismissal. Perforations of Shrapnell's membrane with simultaneous existence of a dyscrasia are excepted ; in these cases immediate discharge. 2. In chronic suppurations of the middle ear, immediate discharge. 3. In dry perforations the persons examined may be taken into service if the perforation is not too large, if it is not in Shrapnell's membrane, if no granulations or polypi are present, if no chronic naso-pharyngeal catarrh and no dyscrasia (except syphilis) exist.

10. GOMPERZ reports three cases of spontaneous shrinking of aural polypi ; his treatment consisted only in cleaning and air-douche. In two cases portions of the shrinking polypi were removed and subjected to histological examination, the sections being illustrated. From his observations, Gomperz infers that " the possibility of spontaneous shrinking of genuine polypi—tumors lined with epithelium—and also of pedunculated polypi is undeniable." He believes to be justified in recommending, if

no caries, no retention of pus, or no other aggravating symptoms are present, not at once to resort to the snare, but for several days to await the effect of the treatment, consisting only of air-douche, irrigation, and disinfection.

11. LEVY gives two full histories of cases of primary external periostitis of the mastoid process, and of primary purulent inflammation of the mastoid cells. The abscess of the first case was incised, the opening was irrigated, and the wound covered with a cataplasm. On account of this obsolete treatment, additional suppurative inflammation set in, so as to necessitate a radical operation under anæsthesia. In the second case, the mastoid exhibited slight symptoms, whilst the tympanic cavity was healthy, as stated by an exploratory puncture. Whilst the pain persisted, facial paralysis with hemiplegia set in, discharge of sanguinolent fluid from the external meatus, and exitus letalis in an hour. Autopsy was not permitted.

12. JACOBY reports twenty histories of cases of operation of caries of the temporal bone. He believes that his communicated histories may certainly serve as guides, how in similar cases we may go to work, and how we should not. We learn from them that : (1) Irrigations under pressure are to be rejected, because of the production of facial paralysis (Case 1) and of exitus letalis (Case 2) ; (2) that irrigations through the tubes, during the last stage of an acute otitis, may cause inflammations of the mastoid process (Cases 3 and 4), and are, therefore, also to be rejected ; and (3) that for chiselling of the mastoid an exact knowledge of the anatomical relations is necessary (Case 4).

13. COLLIER reports thirteen cases of excision of the ossicles. Full anæsthesia is necessary. The remnants of the drum membrane are removed with a trowel-shaped knife. The incudo-stapedial joint is cut through with a knife bent at an angle, and the malleus and incus are removed with a forceps after the severance of the adhesions. Eight cases recovered, five improved. The hearing faculty is in most cases considerably improved. The subjective symptoms, headache, tinnitus, etc., frequently disappear.

14. Scarlatinous otorrhœa of old standing, intense pain in the diseased ear for three weeks. Facial paralysis, marked signs of retention. Cutis of the mastoid process not materially changed. Chiselling. Extensive caries is found ; the tympanum and antrum have become one cavity, of the size of a walnut. On the sixth day after the operation, death from pyæmia. The post-

mortem examination revealed perforation of the pus into the cerebral cavity at two places—first, into the middle cerebral fossa; secondly, into the transverse sinus,—which was followed by sinus phlebitis and thrombosis.

15. A boy, four years of age, was seized a year ago by pertussis, and suffered since that time from otorrhœa. Nine months ago abscess behind the ear, which healed after the elimination of a small sequestrum. Facial paralysis for six months; otorrhœa persisted. WEIL detected at the bottom of the external meatus a sequestrum, which after extraction was recognized as the greater part of the cochlea, the vestibulum, the outer lower semicircular canal, and portions of the other two.

16. KOERNER has collated one hundred cases of cerebral abscess from aural disease, and arrives at the following results. In 62 cases the abscesses were found in the cerebrum, in 32 in the cerebellum, in 6 in the cerebrum and the cerebellum. In children under ten years of age the cerebellar abscesses are comparatively less frequent. The disease is twice as frequent in the male as in the female sex. The brain abscesses are more frequent on the right side than on the left. With reference to the transmission of the affection from the temporal bone to the brain, Koerner comes to the conclusion that, in opposition to prevalent views, a considerable number of the brain abscesses developing in the course of an otorrhœa occur close to the primary affection, and are quite frequently, as it can be proven, continuous with the same. "Aural brain abscesses are principally found in those affections of the petrous and mastoid portions, which reach the dura mater, and they are located in the cerebrum in 64.8 per cent., in the cerebellum in 73.3, and in the cerebrum and cerebellum combined in 83.3 per cent. of the cases." Dura mater and brain substance between the destroyed bones and the brain abscess are frequently affected; in a considerable number (in twenty among ninety cases) existed a more or less wide connection between the deposits of pus in the bone and in the brain." With reference to the seat of the abscess, it is proven that brain abscesses transmitted from a diseased temporal bone are located in the adjoining parts of the cerebrum, viz., in the temporal lobe or in the cerebellum of the corresponding side.

NERVOUS APPARATUS.

17. MARINA, ALLESSANDRO R. Contribution to the symptomatology of tabes dorsalis, with special reference to the ear, larynx, and pharynx. *Arch. of Psych.*, vol. xxi., No. 1.

18. WINTERNITZ, LUDWIG, Vienna. A case of sudden deafness, with recovery. *Monatsschr. f. Ohrenheilk.*, etc., 1889, No. 11.

17. MARINA describes the symptoms arising from the ear, larynx, and pharynx in forty cases of tabes dorsalis. The aural examinations were made by Mörpurgo, and the complete histories and the results of examinations were communicated. Seven cases (17.5 per cent.) among the forty had normal hearing, fifteen (37.5 per cent.) showed sure signs of bilateral affection of the inner ear, ten (25 per cent.) uncertain signs of uni- or bi-lateral affection of the inner ear, five cases were combined affections (middle and inner ear), and four cases were confined to the middle ear. The diagnosis of an affection of the middle or inner ear was made by means of Rinné's experiment. The pitch used for examination was, I regret to say, in most cases not stated, nor the time of hearing, which resulted from it; besides, the relation between the faculty of perception of high and low notes was not sufficiently taken into consideration. The diagnosis of disease of the inner ear suggests the unintentional idea of an affection of the labyrinth. The author believes, in spite of this diagnosis, to be justified in assuming "that in some cases not only the end apparatus, but also the acoustic nerve is implicated, principally in those cases in which the function is greatly impaired. Ménière's disease was not observed in any of the patients; neither subjective noises nor hardness of hearing were complained of by the patients. The hearing troubles in tabes may occur in every stage. Eight among eleven patients exhibited a more or less marked hyperexcitability of the acoustic nerve for electric irritations.

18. The case reported by WINTERNITZ showed unilateral deafness, which appeared suddenly with vertigo without objective changes at the hearing organ. Recovery under application of the constant current.

NOSE AND NASO-PHARYNX.

19. ZWAARDEMAKER, H., Utrecht. Cocainization of the nasal cavity and of the cavum pharyngo-nasale. *Arch. f. Ohrenheilk.* vol. xxix., p. 12.

20. SUCHANNEK, H. Zurich. Contribution to the after-treatment in operations in the nasal cavity. *Therap. Monatshefte*, 1889, No. 2.

21. SCHNEIDER. Some cases of cured nasal reflex epilepsy. *Berliner klin. Wochenschr.*, 1889, No. 43.

22. ZIEM, Danzig. Intra-ocular affections in nasal troubles. *Berliner klin. Wochenschr.*, 1889, No. 38.

23. BRONNER, ADOLF. Some relations between the diseases of the nose and the eye. *Journal of Laryngology and Rhinology*, December, 1889.

24. ROTHOLZ, Stettin. Habitual epistaxis. *Deutsche med. Wochenschr.*, 1889, No. 40.

25. POTIQUET. The form of the nose in genuine ozæna or rhinitis atrophicans fœtida (sur la forme du nez dans l'ozène vraie ou rhinite atrophiante fétide). *Revue mens. de laryng., d'otol.*, etc.

26. SCHUBERT, PAUL, Nuremberg. Fungi in the nose. *Berliner klin. Wochenschr.*, 1889, No. 32.

27. BAUMGARTEN, Budapest. Rhino-surgical communications. *Ibid.*, 1889, Nos. 51 and 52.

28. GERBER. Contributions to the knowledge of the pharyngo-nasal syphilitic affections.

29. BRAUN. Extreme stuttering, hardness of hearing, and intense headache with incapacity of concentrating the attention for a longer period to an object (aproxexia, Guye). Cured by destruction of adenoid vegetations in the naso-pharynx. *Wiener klin. Wochenschr.*, 1889, No. 46.

30. MÜLLER, Berlin. Hysterical paralysis of the velum palatinum. *Charité-Annalen*, vol. xiv., p. 247.

31. Prof. ZAUFAL. Demonstration of a naso-pharyngeal-polypus. *Prager med. Wochenschr.*, 1889, No. 30.

32. KAFEMANN, Koenigsberg. Electrolytic treatment of chronic pharyngeal catarrh. *Deutsche med. Zeitung*, 1889, No. 70.

19. ZWAARDEMAKER recommends for cocainization of the naso-pharyngeal cavity an insufflator, consisting of a glass tube, through which the cocaine is applied as a powder.

20. SUCHANNEK describes an extremely minute method for the purpose of protecting the wounds against infection. It consists principally of partial plugging the nose with a 50-per-cent. iodoformized gauze, which is left for 3 to 4 days after operation with the cold snare, and for a week after cauterizations. If it cannot be borne, brushing with iodoform collodium is used in its place. After the removal of the plugging $\frac{1}{4}$ -per-cent. solutions of iodide of potassium in glycerine are locally applied for a few days.

21. SCHNEIDER has in five years observed six cases of reflex epilepsy of the nose, in which delusions are to be excluded. Several patients had considerable hypertrophies of the turbinated bodies, which partially caused asthmatic troubles. Their removal with Sommerbrodt's spiral burner was a marked success in every case. The same treatment, however, was without avail in a seventh case. The interesting histories are recommended by the reviewer for perusal in the original.

22. ZIEM holds that disturbances of the circulation within the eye are frequently caused by homologous troubles of the nose and its accessory cavities, and that in such cases it is indicated to institute proper treatment of the nasal affection. The author details as proof the histories of seven patients, who suffered from contraction of the field of vision and the range of accommodation, anomalies of refraction, subjective increase of tension of the globe, and similar symptoms. Simple nasal irrigations, principally irrigations through Highmore's antrum, resulted in material improvement of those phenomena.

23. BRONNER discusses the relations between ophthalmic and aural affections, and reports two cases in which treatment of the nasal affection cured the affection of the eye.

24. ROTHHOLZ, in accordance with other authors, has found the seat of the bleeding almost invariably upon the cartilaginous septum, and here upon its anterior portion, where it adjoins the septum mobile. In the paper, which is intended for the general practitioner, the author mentions a case of *ulcus septi nasi perforans* (Voltolini). In a young man, aged sixteen, with habitual epistaxis, "there was found at the typical place on the left side a marked loosening of the mucous membrane of roundish form, of about 1 cm. in diameter, slightly bleeding on probing; the corresponding place of the right side was normal." After cauterization with chromic acid the bleedings ceased. After two months, the author noticed at the same place a roundish perforation of the size of a ten-cent piece. The patients had not complained of any thing. A whitish coloring of the epithelium at the diseased place, as is described by Rossbach, could not be found; the author, however, thinks it to be characteristic of the *ulcus perforans*, that the perforation cannot be retarded, and that it does not increase or extend. There is no relation with syphilis.

25. POTIQUET, from his observations made in twenty-three *ozæna* patients, believes that the flat nose is not conducive of

ozæna. The flat and saddle nose owe most frequently their origin to a preceding rhinitis atrophicans. Adult ozæna patients have not the form of the nose which they ought to have inherited. The formation of the nose of ozæna patients is not in harmony with that of the skull. It depends upon the heredity, duration, and intensity of the affection, and also upon the time of its beginning.

26. The patient with bilateral nasal obstruction and offensive discharge was permanently cured by simple syringing and some insufflations of boric acid. The grayish-green and hardly soluble contents proved microscopically to be a fungus, which had beyond doubt grown as a saprophyt in the nasal secretions, since the mucous membrane of the nose was completely normal after removal, and no relapse occurred in spite of the mild treatment. Examination made by competent authority (Ferd. Cohn) confirmed the resemblance of this fungus, observed for the first time in the nose, with some others, which cause great ravages as parasites among the insects (silk-worm, gastropacha pini), but excluded its identity with aspergillus and mucor.

27. BAUMGARTEN describes : 1. A case of rhinolithiasis in a woman, æt. fifty-four, which was associated with nasal obstruction for ten years, continuous pain in the zygomatic and temporal regions and offensive discharge. One of the removed concretions contained two grape-stones. 2. Perforation of the nasal septum by diphtheria. Ulceration with perforation of the size of a lentil. 3. Membranous occlusion of the choanæ associated with adenoid vegetations, cured by galvano-cautery. 4. Two cases of rhinitis and rhinopharyngitis fibrinosa, which developed in the first case after the use of the galvano-cautery and in the second case spontaneously. Cured by iodine glycerine solution. 5. Gumma of the nose and naso-pharynx. Cured by mercury and iodide of potassium.

28. GERBER gives a series of twenty-seven detailed histories of early tertiary syphilitic affections of the nose, naso-pharynx, and mouth. He arrives at the following conclusions : It is immaterial whether treatment with mercury has taken place or not ; the greatest danger of a relapse exists from the first to the third year and from the eighth to the fourteenth year *post infectionem*. Furrow-shaped ulcers of the septum taking a sagittal direction are a valuable aid for the diagnosis of nasal and naso-pharyngeal syphilis ; the odor is not pathognomonic. In syphilis of the naso-

pharynx rhinoscopia posterior is indispensable, since marked symptoms might be absent in the mouth, pharynx, and nose, as Case 15 clearly demonstrates. The prognosis is favorable, even after the duration of the syphilitic affection for several months, under suitable specific local and general treatment. The atrophy which develops in consequence of the affection cannot be cured.

29. College pupil, æt. fifteen, is affected with the anomalies mentioned in the heading. The affection began six years ago and grew gradually worse. The naso-pharyngeal cavity was completely filled with adenoid vegetations, the choanæ and mouths of the Eustachian tubes being occluded. The vegetations were removed in twenty sittings with the galvano-cautery under the guidance of the mirror, and thus all symptoms were relieved. Even the stuttering had almost entirely disappeared after the eighth sitting.

30. In a girl, æt. eighteen, who had suffered two years previously from "diphtheria," paralysis had followed an angina. The speech had a nasal twang; in pronouncing the A (ā as in father) the velum rose slightly. Patient never got any food into the wrong passages during swallowing; the sensibility was greatly diminished. Besides these two signs the diagnosis of hysteria was supported by the absence of other paralytic symptoms, but principally, after a cure had been effected in a few days by slight faradization, by the development of a relapse, associated with aphonia, after four weeks, in consequence of a strong emotion, which was cured by strong faradic currents in one sitting.

31. ZAUFAL, at the summer meeting of German physicians of Bohemia, demonstrated a naso-pharyngeal polypus, which, according to his opinion, was the largest of those described heretofore. It weighed 112 grammes, and was 11 centim. long, 6 centim. wide, and had 14 centim. in circumference. The patient had first troubles in speaking seventeen years previously, but difficulty in swallowing not before the last two weeks. The lower extremity of the tumor reached the entrance of the larynx, one process filling the left lower meatus. The finger introduced into the mouth could feel around the tumor up toward the left choana. It was removed by first raising its lower part into the mouth, grasping it with both hands and then pulling it out by a strong pull. On the sixth day after the operation intense bleeding, which was stopped by plugging with Belloc's canula, followed by bilateral purulent otitis media. Recovery in four weeks with normal hearing power.

32. KAFEMANN attributes *a priori* great value to electrolysis and emphasizes its real, not theoretical, effects. The electrodes, of which three different ones are illustrated, are attached to a handle and thrust into the follicles or lateral thickenings. In the former the action of not too strong a current lasting a few seconds is sufficient. In the latter, thirty to sixty seconds, or eventual repeated applications, are needed. The advantages of the treatment over the galvano-cautery are, according to Kafemann, as follows : It is carried out without danger, it is easy of access, also for the inexperienced practitioner, and there is much less inflammatory reaction connected with it.

BRITISH OTOLOGICAL NOTES.

APPOINTMENTS.

EDINBURGH ROYAL INFIRMARY.—Dr. Mackenzie Johnston has been appointed Assistant to Dr. McBride in the Throat and Ear Department.

CENTRAL LONDON THROAT AND EAR HOSPITAL.—V. Wyatt Wingrave, M.R.C.S., L.R.C.P., has been appointed Registrar and Anæsthetist.

WALTER FOWLER, F.R.C.S., etc., has been appointed Assistant Surgeon.

BIRKENHEAD EYE AND EAR HOSPITAL.—Wallace Q. MacAdam, M.B., C.M., has been appointed Honorary Surgeon.

ABERDEEN INFIRMARY.—Dr. Mackenzie Booth, Lecturer on Diseases of the Ear and Larynx to the University, has been appointed Assistant Visiting Surgeon.

ST. MARK'S OPHTHALMIC AND AURAL HOSPITAL, DUBLIN.—W. R. Graves, L.K.Q.C.P., L.R.C.S.I., has been appointed Pathologist.

EDUCATION OF THE DEAF AND DUMB.

The Pure Oral Institution held a festival at the Hôtel Métropole on May 12th, and at the end of the same month the annual meeting of the Ealing College Training School for teachers by the same method was held, by the kind permission of the Bishop of London, at Lambeth Palace.

We are pleased to be able to announce that the bill providing for the education of blind and deaf-mute children in Scotland, having passed through all its parliamentary stages, has received Her Majesty's consent, and has therefore now become law.

ORAL TEACHING OF THE DEAF AND DUMB.—A meeting of the supporters of this institution was held in the Steinway Hall, Lon-

don, on July 22d. Lord Granville presided, and the Countess of Roseberry distributed the prizes which had been awarded to the successful students during the preceding term. From the report, which was read at the meeting, it appears that thirty-four boys and nineteen girls have attended the classes during the last year, and ten students have been received into the teachers' training college. It was incidentally mentioned that the demand for teachers exceeds the supply.

The recent agitation in England on behalf of the deaf and dumb appears to be extending to its colonies. News reaches us from India that a wealthy native (Babra Girindra Nath Bose) has offered to give 1,000 rupees (about £80) towards the cost of erecting an educational establishment for the deaf at Calcutta, and a further sum of 2,400 rupees (about £200) annually for three years towards the endowment. The building of the institution may therefore almost be considered *un fait accompli*, for it is more than probable that the Imperial Government will guarantee the remainder of the money.

At a representative meeting of the deaf and dumb, held at Leeds on July 24th, it was resolved to form "A NATIONAL DEAF AND DUMB ASSOCIATION," and rules were adopted and officers appointed. The objects of the Association were stated to be "to protect the interests, elevate the social status, and secure higher education for the deaf and dumb." We cordially wish the new combination every success.

A new Italian journal, to be issued monthly, and entitled *Il Sordomuto*, has been started by Dr. G. Longhi, founder of the Orotherapeutic Institute of Milan.

MISCELLANEOUS.

The schemes arranged for the Post-Graduate Courses at Edinburgh and Glasgow respectively appear to be very complete. At the former Mr. Reginald Horsley lectured and demonstrated upon diseases of the ear and throat at the New Town Dispensary, while at Glasgow diseases of the ear are treated by Drs. Barr and Macfie. With these examples before them, it is to be hoped that the managers of the London Post-Graduate courses may, in future, be induced to add "Diseases of the Ear" to their list; we feel convinced that there are few subjects which would be more highly appreciated.

Arrangements are being made for the erection of additional

buildings in connection with the Royal Infirmary at Edinburgh. By this means it is hoped to be able to set aside special wards for the reception of ear, throat, and skin cases.

The foundation stone has been laid in Birmingham of a new Ear and Throat Hospital which promises to be a noteworthy addition to the charitable institutions of that city. Accommodation for twenty in-patients is to be provided, as well as for a large out-patient department.

The recent annual report of the Glasgow Ear Hospital shows a steady increase in the number of cases treated, and since the publication of the last report, considerable improvement has been made in the service of the hospital. A ward containing six beds has been started, and an operating room fitted up; fifty-six patients have thus been enabled to obtain the advantages of indoor-treatment.

By the death of G. N. Clark, Esq., L.S.A., L.R.C.P., an old Newcastle practitioner, the Northern Counties' Deaf and Dumb Asylum benefits to the extent of £500, and a similar sum has been left to the same institution by the late R. W. Hollin, Esq., formerly Lord Mayor of York.

The late Mr. Andrew Peckard has bequeathed the sum of £250 to the Leeds Institution for the Blind, Deaf, and Dumb.

The Yorkshire Institution for Deaf and Dumb Girls has received a bequest of £200 under the will of the late W. Aldam, Esq., of Tuckley Hall, Yorks.

Our contemporary, the *Lancet*, issues a timely warning on the promiscuous use of "ear drums." We cannot do better than quote the concluding paragraph of the article: "Certain much-vaunted drums are given, or, rather, sold, by quacks to patients suffering from all and every kind of deafness, to such an extent that nearly ninety per cent. of patients have another rigid drum placed upon a natural drum which is already too dense."

With this opinion probably all aural surgeons will be disposed to agree; it becomes a serious consideration, therefore, for them not only to discountenance the abuse, but to take care that they do not, by the indiscriminate advocacy of the claims of their own inventions, lead to the encouragement of the mischief which, on the contrary, it should be their aim to minimize.

In the *Australian Medical Gazette*, of July, Dr. W. Quaife publishes particulars of an interesting case of deafness associated with congenital syphilis.

SOCIETY MEETINGS.—At a meeting of the Lancashire and Cheshire Branch of the British Medical Association, held at Owens College, Manchester, on July 2d, Mr. Milligan read a paper upon "The choice of a Caustic in the Treatment of Granulations of the Middle Ear," and Dr. Larmuth showed some interesting cases of ear disease.

BRITISH MEDICAL ASSOCIATION.—The annual meeting of this association was held in Birmingham from July 29th to August 1st, 1890. In the section of Otology, Dr. Charles Warden presided and delivered an able and interesting address upon "Specialism and Specialists."

The meetings of the section were well attended, and many of the papers read gave rise to considerable discussion. We hope to be able to refer in detail to these papers on a future occasion, and will therefore content ourselves at present with a bare enumeration.

Mr. Arbuthnot Lane advocated the more frequent performance of mastoid trephining in his paper on Chronic Suppurative Catarrh of the Middle Ear.

Mr. W. H. Stewart, on the Treatment of Chronic Suppuration of the Middle Ear, spoke against indiscriminate syringing in unskilled hands, preferring irrigation with the intra-tympanic douche.

Dr. Donald Stewart read a paper on the Comparative Advantages of the Eustachian Catheter and Politzer's Bag for Inflation of the Middle Ear.

A discussion on Intra-nasal Disease in Relation to Aural Affections was introduced by Mr. L. Brown, Mr. Macnaughten Jones initiating the discussion on the Etiology of Tinnitus.

Dr. Barr read a paper on the Injurious Effects of Loud Sounds upon the Hearing, with Special Reference to Railway Whistles. Demonstrations illustrative of the value of artificial drumheads were carried out by Dr. Ward Cousins.

Dr. A. Bronner read a paper on the Importance of Detecting and Treating Diseases of the Ear and Post-Nasal Growths in the Children of our Board Schools.

Reviews.

Pathology and Therapeutics of Mouth-Breathing.
By Dr. EMIL BLOCH. Wiesbaden : J. F. Bergmann. 1889. Reviewed by Prof. S. Moos.

The author, who has already published in these ARCHIVES his studies on the physiology of mouth-breathing, makes in the work now lying before us "the first attempt to look at a time-worn topic from a new aspect." With these words he introduces himself to the reader, and hopes that investigation will show that the attempt has been useful. At all events any one who has so thoroughly studied his subject as has the author has a certain right to illuminate it from the standpoint of physiology. For this purpose he seems to have had a large experience, and to have zealously collected his own observations, to say nothing of an exhaustive bibliography of the subject appended to the work. For these reasons alone the book is worthy of great merit, and chiefly because we here find in a nutshell, as it were, every thing of importance and of use to the practitioner. And therapeutically the book actually gives us more than we had promised to us, and above all not only the etiology and the symptomatology but the hygienic aspect are brought well into the foreground.

The contents are as follows, by chapters :

I. Contrarespirator—II. Physiology of Nasal Breathing ; Comparison with Mouth-Breathing—III. Causation of Mouth-Breathing—IV. Mechanism of Mouth-Breathing—V. Symptoms and Sequences of Mouth-Breathing—VI. In this chapter we especially note what the author says in regard to the etiology of diphtheria, and in the relation of nose-breathing to enuresis nocturna—VII. Treatment of Mouth-Breathing.

We cannot at this time enter into details, and simply commend in the warmest fashion the book to our colleagues as both practical and useful.

The Corrosion-Anatomy of the Osseous Labyrinth of the Human Ear. Atlas of 10 plates, with text, in portfolio, \$2.50. By Dr. FRIEDR. SIEBENMANN, Lecturer on Otology and Laryngology at the University of Bâle. J. F. Bergmann, Publisher, Wiesbaden, 1890. Reviewed by Prof. F. Bezold, Munich.

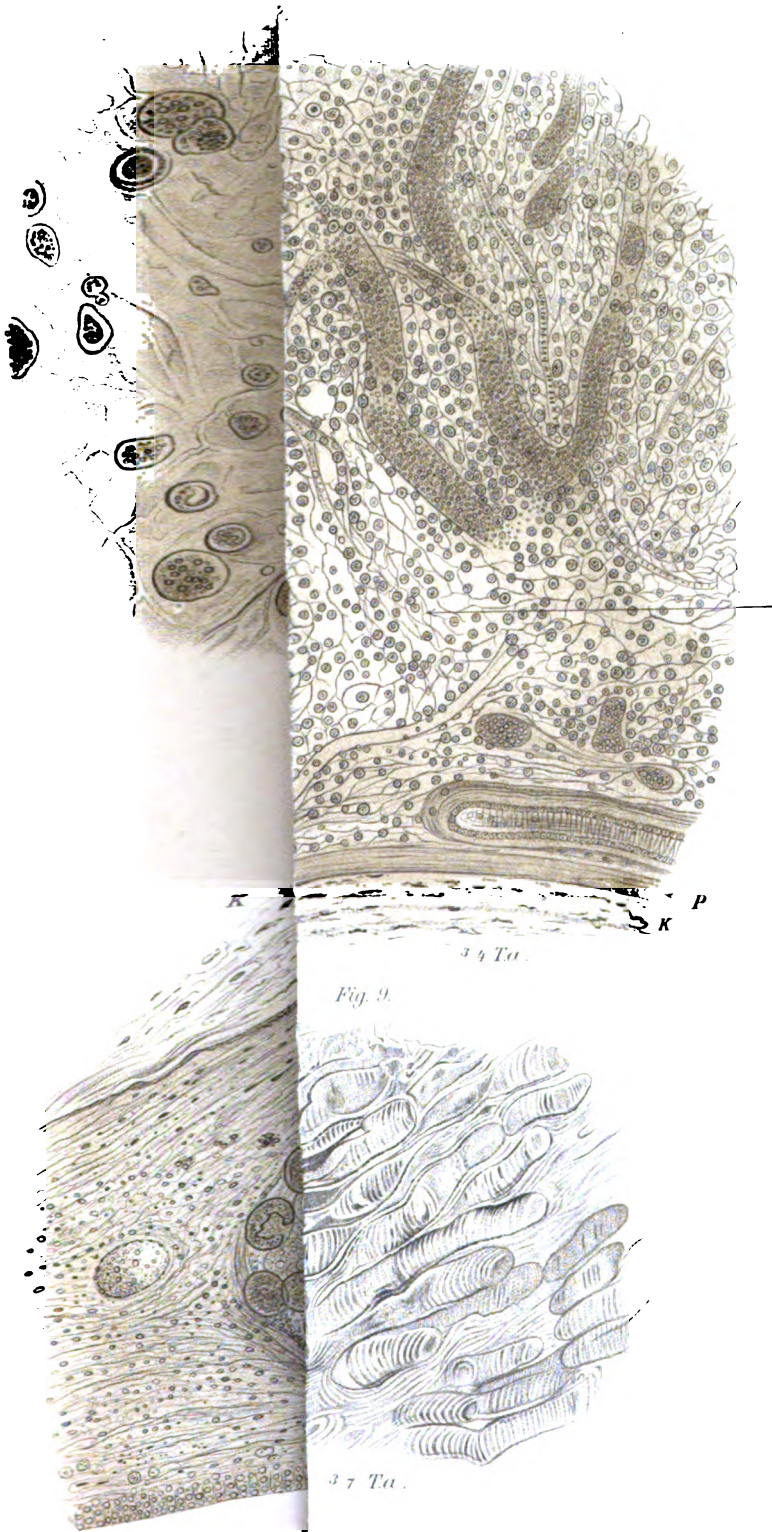
The cavities of the macerated temporal bone, brought to view by metal casts according to the corrosion method, are carefully described and superbly illustrated in this work. The technique to obtain such casts, the detailed description of which forms the introduction to the monograph, has been so much perfected by Siebenmann that the most delicate details come out with wonderful clearness and accuracy. It is to be hoped that this method will soon be generally used in studying and teaching otology.

Siebenmann confines himself to the morphology of the labyrinth and its surroundings, though his specimens present all the cavities of the temporal bone with equal perfection.

The cancellous bone substance enclosing the labyrinth, all the smaller and larger cavities, the two aqueducts, the vascular and nerve canals of the child as well as of the adult, are beautifully illustrated and clearly described. The reviewer feels exceedingly gratified by Dr. Siebenmann's excellent work, it being a continuation and supplement of his own "corrosion anatomy,"¹ which concerned only the middle ear. The youthful, intelligent, and painstaking investigator [Bezold's former pupil—ED.] has thus with admirable success relieved him of a difficult task which otherwise he would have thought incumbent upon himself.

¹ See these ARCHIVES, xiii., 79.

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ARCHIVES OF OTOTOLOGY.

OPERATION FOR THE RELIEF OF DEAFNESS, NOISES IN THE HEAD AND EARS, AND VERTIGO, DUE TO CHRONIC CATARRH OF THE DRUM OF THE EAR.

By SAMUEL SEXTON, M.D.

HAVING been requested to report some of the cases of catarrhal disease of the mucous membrane lining the drum of the ear in which the more serious symptoms arising therefrom have been cured, or relieved very much, by an operation, I have selected for this purpose several unpublished cases that are well known to the profession, with the hope that they will be found of interest to the otologist and others whose advice may be sought for the treatment of the distressing symptoms of this form of ear disease.

CASE I.—Mrs. A., age forty-six, New York, came to consult me over two years ago with a most distressing history. For ten years she had gradually been getting more and more deaf, specially in the left ear. About one year ago she became decidedly more deaf in the right ear. Having now been over six years under special treatment, and constantly getting worse, she was greatly discouraged. The noises and beating in the head and ears had, indeed, become unbearable; in the left ear it was like the confused din of a machine-shop. This severe form of tinnitus having existed for many months, and having been led to believe that her case was hopeless, she felt that if no relief was obtained she would lose her mind. It was in this state that, after consulting her family physician, Dr. J. D. Bryant, about the matter, she came to the writer to avail herself of the benefit of an operation on one or both ears. On examination the following conditions were found to exist :

Hearing : The tuning-fork on teeth not heard in the ears, but sounds like a bell in the head. Plain, ordinary voice could be heard about three feet only in either ear when short familiar sentences were used, but general conversation, with more than one person, was impossible. Owing to the deafness and noises in her head and ears only a most unbearable and confused tumult of noises could be heard at theatrical or musical entertainments.

She heard best in noisy vehicles, railway-cars, and the like.

The drumheads were lustreless ; the left was retracted and somewhat irregular, the latter condition, perhaps, a result of otitis media in infancy. Both drums were affected by chronic catarrhal inflammation.

I removed the drumhead and malleus from the left ear, March 25, 1889. The incus and stapes lay beyond the range of vision, and were left. Soon after regaining consciousness she heard a clock striking, which had been inaudible to her for a long time.

On the fifth day patient came to my office, hearing gradually becoming more clear and the noises diminishing. There was a slight disturbance in sense of taste.

Reproduction of the drumhead began early in April and the opening in the course of some months almost closed, the granulating process being attended by more or less discharge. The results of this operation were so gratifying that on June 5, 1890, I performed the same operation on the right ear, which subsequently took about the same course the left one had done. The case was not seen during my absence in Europe for the summer, but when examined in October both drumheads were almost reproduced by new-formed tissue, small openings only remaining in either. An attempt was made to maintain more free openings by treating the new membranes with traumaticine in which salicylic acid had been dissolved. The effect of this was to enlarge the openings somewhat, but they constantly showed a tendency to reproduce themselves. I finally restricted the patient's diet very much for some weeks, and then, after deadening the sensibility of the reproduced membranes with a ten-per-cent. solution of cocaine, cut them away, and there has been no return. When examined in March, 1891, the openings were large and the drums dry.

The patient is now able to enjoy social life again : can keep up conversation in the drawing-room or at the dinner-table without effort. The opera and theatre are once more a source of

pleasure, though at the latter she cannot sit farther from the stage than the sixth row of orchestra chairs. The distressing noises in the head and ears no longer exist. In a word, since the operations she has resumed her former position in family and social life generally, and enjoys the best of health.

CASE 2.—Mr. de C., of New York, age thirty-two, was seen in 1888. First experienced deafness eight years ago, but it did not seriously inconvenience him until four years ago, since which time he has consulted many specialists both in this country and in Europe, generally receiving a discouraging prognosis. The left ear was first affected; the right ear has been getting worse for two years, markedly so within the past twelve months. Patient was an active member of the Stock Exchange for ten years previously to 1886. He took cold easily, and has had dental irritation. His temperament is nervous. He became much run down while in active business, and the deafness contributed greatly to increase his despondency, since, being very musical, it interfered with musical pursuits. The right drumhead porcelain-like in color, yet translucent enough to allow the long process of the incus to be seen through it. The left was humid and dull in look.

Hearing: In the left ear hears loud voice at five feet, but at twenty feet shouted words are not distinguishable; watch, $\frac{5}{8}$. Right ear: hears ordinary voice, if plain, five to eight feet, loud voice at twenty feet; watch, $\frac{5}{8}$.

His general condition delicate; subject to colds and head-aches.

On *January 2*, 1890, removed drumhead and malleus of left ear, and separated the incus from the stapes. The chorda tympani was divided.

Jan. 3d.—Feels well, is sitting up. Hearing in operated ear: plain ordinary voice at five feet, rather loud at eight feet; watch, $\frac{5}{8}$. *January 10th*, when seen at my office, the drum cavity was clear; slight disturbance in taste.

Jan. 10th.—Hears low ordinary voice in left ear at five feet; ordinary voice, at ten feet; plain, ordinary, at twenty feet; watch, $\frac{5}{8}$.

Jan. 17th.—Reproduction of the drumhead began, the margin widening all around as usual in such cases, with granulation and slight secretion.

February 18th.—The reproduction seemed complete, but on manipulating the parts a large crust came away, leaving a

large opening in the drumhead. The tendency to closure was for several months met by widening the opening slightly with the knife under cocaine, and treating the parts with a solution of acid salicylic in traumaticine, under cocaine, until a firm film was found over the parts. This, when removed after a few weeks, left a large permanent opening. When last seen, February, 1891, the drumhead was absent, and hearing was still good. The patient has also very much improved in general health.

CASE 3.—Mr. C. C. M., of Fairport, N. Y., was first seen by me on March 15, 1889. Had been almost totally deaf in the right ear since having otitis with earaches as a sequence of scarlet fever in childhood. The hearing of the left ear has been defective for past seven years, due to chronic catarrh. He has for many years been overworked and subject to bad colds. There was a sense of pressure and fulness in the right ear. Examination of the right ear discloses a cicatricial retracted drumhead; the malleus is displaced, its neck presenting below the margin of the auditory plate; the attachment of the tensor tympani muscle is visible. When the drumhead is touched with a probe, a sound is produced like the crumpling of parchment.

The left drumhead is lustreless and succulent in appearance.

Hearing: Right ear, ordinary voice heard, when spoken half-inch from the ear, at one foot scarcely at all.

Left ear, ordinary conversation heard at one inch if plainly spoken, at one foot hears a word now and then if familiar sentences are used. At three feet hears shouting with difficulty.

The tick of watch not heard in either ear. He does not have much tinnitus, but on over-exertion becomes dizzy. Hears best in a noise, but when tired hears badly, and on some days can scarcely hear at all.

March 16th.—Under ether, removed drumhead and malleus from the right ear. The incus and stapes were not visible, being enveloped in cicatricial tissue. No attempt was made to remove the incus.

On going down to breakfast the morning after the operation, an altered sense of taste was noticeable, but this gradually disappeared in the course of a few months.

When examined at my office on March 18th, the drum of operated ear was dry, and the sense of pressure and fulness absent. He could hear ordinary voice at from three to five feet, and loud voice at twenty feet.

When last seen, September 25, 1890, there was no tinnitus or other sensations in the right ear. The improvement in hearing for conversation remained, and the tick of a watch was audible on contact. The drum was dry and white in color, and there was no reproduction of the drumhead. His general health was excellent.

CASE 4.—Miss D., of Florida, aged fifty-two. Four years ago, after having "malarial" fever, for the cure of which large doses of quinine were taken (for two consecutive days, sixty to eighty grains daily), she experienced great ringing in the ears, which has continued more or less ever since, and from that time her deafness was marked. From 1860 until 1872 she was an invalid, having suffered from nervous prostration, and was treated by Dr. Brown-Sequard for hysterical torticollis of the left side. Has had much dental irritation. Both external auditory canals were sodden and exfoliating from long use of glycerine. The drum-heads are dull and humid in appearance.

Hearing : In left ear hears ordinary voice at two feet. In right ear hears low, plainly spoken voice at three or four feet, but it seems muffled. At twenty feet loud voice badly heard using both ears ; in fact, not much better at ten feet. There is a wave-like murmur in addition to the ringing, and at times a friction sound in the ears. Her own voice seems so loud to her that she speaks in a low tone.

November 5, 1890.—At Dr. Janvrin's private hospital removed drumhead, malleus, and incus from the left ear.

There was slight purulency for a short time, but the drum soon became dry.

When she left for her home early in December she was feeling well and could hear in the operated ear ordinary voice at four feet, loud voice at ten feet, and fairly well at twenty feet. The tinnitus was decidedly better. The absence of undue tension in the operated ear was a source of great comfort.

CASE 5.—Miss C., aged twenty-two years. Has been more or less on the verge of invalidism ever since childhood. After having typhoid fever at the age of fourteen years experienced a "queer feeling" in the right ear, and was treated for a long time by several specialists. Since the age of seven years was kept closely at school in this country, and in her sixteenth year was taken abroad and spent five years at pretty hard study, including music, with intervals of travelling. The latter was, perhaps, as exhausting as the former.

Was in Europe again in 1890, and overworked herself again both mentally and physically. Spent a month at the Paris Exposition, and afterwards had *la Grippe* for another month. As a result of overwork she has become exceedingly neuropathic, and very much distressed about the right ear, which has become quite deaf, and also the seat of most disagreeable noises. She has scarcely left her bed for the past three months. The noises in the right ear are constant. There is a sound like a "sea-shell," and when she is nervous there are occasional "explosions" like the sudden escape of steam, along with a disagreeable sense of pressure in the ear. The noises often vary. For the past five years the right ear has constantly grown worse, though some of the time under special treatment for the ear or nose.

In the left ear, sixteen months ago, a sense of fulness was experienced, lasting three months, and succeeded by tinnitus now and then, similar to the right ear. She has some "dead" teeth, and has not cut any of the wisdom teeth.

The right drumhead is dull and porcelain-like in color, the malleus handle prominent. The left drumhead is clear but not brilliant.

Hearing: Right ear, ordinary voices six inches. Watch $\frac{1}{4}$. Left ear normal, even hyperacute for voice and watch.

May 6, 1890.—Removed the right drumhead, malleus, and incus; the ossicles were pretty firmly ankylosed, and the incus which was removed first, came away with some difficulty. The drum cavity was dry and white in appearance.

Hearing for ordinary voice in right ear a few hours after the operation twenty feet, low voice at fifteen feet, and noises began to diminish on the second day.

Patient seen in November. Hearing unchanged, and tinnitus so slight as to not cause any annoyance. There was no reproduction of the drumhead, and the drum was white and dry. The general health was improving.

CASE 6.—Miss U., of New York, age thirty. First seen late in the year 1886. Has always had hay-fever for six weeks every summer and is scarcely ever free of head colds. Has been deaf since childhood in both ears, the left being first affected. At age of twelve years was seen by a London aurist, and has consulted many other specialists on both sides of the Atlantic since that time, but all of them finally said they could do her no good and she is, therefore, willing to try any operation that promises

success. It is much more difficult for her to converse with others in consequence of a high degree of myopia, since she is thus deprived the aid of lip reading. Tinnitus exists mostly in the left ear. There is a sense of discomfort in the left ear, and relief is sought by constantly rubbing it. The deafness is greater in damp weather and during the existence of head colds. Hears better in the noise of a ball-room or street-car. At fifteen feet hears familiar sentences spoken in a very loud tone of voice; unfamiliar sentences scarcely heard at all. Hears a König rod vibrating 35,000 per second held close to ears, but does not detect the ticking of a watch on contact. Cannot follow general conversation close by where more than one person is speaking.

January 4, 1887.—With application of a minute quantity of sulphuric acid removed posterior segment of the right drumhead, after which hearing was greatly benefited, the tinnitus in operated ear ceasing. At the opera, dining-table, and in general conversation she heard very well. Test for the voice showed that ordinary conversation could be understood at 15 feet, and the tick of watch at $\frac{3}{4}$ inches. The drumhead, however, gradually closed up again in nine months and the deafness returned, a result that would have occurred, probably, within a few weeks had not the parts been re-opened from time to time.

November 5th.—The drumhead and malleus of the right ear were removed, when hearing again improved as before. There was much difficulty in keeping the drumhead from reproducing. At times it was cut away, and when borne, treated with collodion or traumaticine in which salicylic acid was dissolved. Finally in May, 1888, the drumhead was found to be entirely absent, and good hearing has remained ever since. It was found necessary, in order to accomplish this result, for the patient to practise abstemiousness in diet, and she lived much in the open air, specially during the summer. In consequence of this improved hygiene she was exempt from the usual severe form of hay-fever and seldom had any head colds.

The good results obtained by the operation on the right ear induced the patient to have the left ear treated in the same manner. Accordingly, on April 29, 1890, I removed the drumhead, malleus, and incus from the left ear. In a few days the drum was found white and clear, and ordinary voice could be heard at five feet, and if plainly spoken at twenty feet. The tendency to reproduction was slight and soon ceased, leaving a large opening. When last

seen in February, 1891, patient heard about as well in one ear as the other, though probably from habit of using the right ear almost exclusively for a long time, she fancies it is the better ear. Ordinary voice is now heard in the right ear from ten to twenty feet, and in the left nearly as well. The watch is heard in both ears at less than an inch.

The sense of taste was unaffected at any time. Patient has escaped hay-fever for past two summers. She can hear very well at the theatre when occupying an orchestra chair six rows from the front, and from her box, which is situated almost opposite the stage, can enjoy the opera satisfactorily.

CASE 7.—Mr. H., aged forty-two, New York, came to see me October 10, 1890. Been deaf noticeably for six years. Was informed by a distinguished authority a few months ago that nothing could be done for his case. Patient's business is regulating the tone of piano-fortes. Since becoming deaf he finds his work very difficult, and sometimes impossible altogether. Regulating the treble (upper register) is the most difficult, because as he sits at the instrument the right ear is presented to that side; the middle register (as would be expected), the easiest. Hunting for the source of jingles and noises makes him very nervous, since he is unable to locate their source. Has severe tinnitus in right ear, like escaping steam. Last December he had a severe fall upon the head, causing concussion of the brain. Since then he is vertiginous and has lost sense of taste and smell.

The drumheads look fairly well, though the right one is somewhat dry and parchment-like. Hearing: right ear, ordinary voice, four inches; the left, much better—a whisper at three feet. Nov. 9, 1890, removed drumhead, malleus, and incus from the right ear. There was some increase of tinnitus and vertigo at first, but in a few weeks the drum became dry, *the noise ceasing entirely*. There is slight tingling in the tongue. Hearing in operated ear: low voice at two feet; loud voice at twenty feet. In about a month the drumhead almost entirely reproduced and hearing diminished. He was, however, able to resume his occupation successfully. Early in 1891 the drumhead was found closed, all but a small opening. The new drumhead being removed, it was found that he could hear ordinary voice at ten feet—a result truly surprising when it is compared to the test made soon after the operation. This opening has remained permanent. The dizziness that followed the fall, over a year ago, remains to some extent, but the tingling has disappeared from the tongue.

The list of cases might be extended, did space permit, but the writer hopes to contribute further to this important subject at another time. The following conclusions are offered, in the meantime, drawn from the cases cited, as well as others occurring in practice.

In certain cases the advance of progressive sclerosis, and consequent deafness, tinnitus, etc., cannot be arrested, nor, indeed, can any permanent improvement in hearing be made by means of any known local medication, directed either to the ear itself or the throat. On the contrary, valuable time may be frittered away in useless experimentation until the disease has become more and more firmly seated. This is the more lamentable in younger patients, where deafness is but beginning, and is therefore amenable to an operation. The deafness due to progressive ankylosis of the ossicula may be arrested in most cases, and where the operation does not improve hearing the further increase of deafness is thus prevented.

That uninformed and inexperienced persons should assert that the operation is both useless and dangerous is to be expected, for opposition to any scientific advance is much easier than making the research necessary to an understanding of the subject. But in some instances there seems to be considerable dread of the operation, due to the belief that a formidable trephining process in the temporal bone is necessary in order to gain access to the parts operated on. This error has gained currency, doubtlessly, from the custom of speaking of either the drumhead or tympanum as the "drum."

The otologist need not, therefore, be surprised that those who have never had the matter explained do not know that all the manipulations in performing the operation are carried on in the ear through the ordinary ear speculum, introduced into the external auditory meatus; that the operation, performed under narcosis, is not attended with any pain, and that there is seldom any reaction or feeling of soreness in the ear afterwards.

Where there is a difference in the hearing power of the two ears the writer usually selects the worse ear for the operation; this rule, however, is by no means always

observed. The operation itself is entirely devoid of danger, no bad effects having ever occurred in my own experience, nor to my knowledge have any ever been reported. It is in all cases performed under narcosis. For many years ether was the anæsthetic employed. More recently I have found the A. C. E. mixture very satisfactory, a small quantity only being required, and nausea seldom following its use. It is composed of one part alcohol, two of chloroform, and three of ether. Antiseptic precautions are always taken. There has always been great difficulty encountered where attempts have been made to establish a permanent opening in the drumhead. The favorite method employed to accomplish this has been the violent removal of the reproduced drumhead and even the bone from which it sprung. It was soon apparent to the writer that the more vigorous the efforts were, in this direction, the more certain was reproduction to take place. It is best, therefore, to keep hands off so long as this process is active, and, if regeneration finally occurs, the newly formed membrane should be carefully cut away with as little irritation as possible. Some restraint in respect to diet is nearly always necessary to be practised by the patient, both before and after the operation. Whenever regenerative action is observable along the incised surface of the drumhead, a thin margin of which nearly always is left after its excision, granulations may be seen springing up, the process being attended by more or less suppuration until a new membrane of greater or less completeness is formed. A rigid enforcement of dietetic rules which almost, or quite, exclude meat, seems to lessen regenerative action.

It has been the writer's practice, even where the patient seems in good health otherwise, to give particular attention to hygienic measures, since there is generally a neuropathic constitution in catarrhal subjects.

I do not always attempt to remove the incus, since it sometimes lies beyond the range of vision, owing to anatomical variations. It is seldom, however, that the incudostapedial articulation cannot be more or less plainly seen by pushing aside the tissues with a probe, and disarticulation

may be easily accomplished without plainly seeing the parts if the anatomy of the region be kept in mind. When the long process of the incus is liberated from the stapes it usually descends somewhat, when its tip can easily be seized with small aural dressing forceps and the incus removed.

As an immediate result of the operation it will generally be found that the hearing for high tones has been improved, sometimes very greatly, so that the rustling sound made by crumpling paper, for example, is painfully loud; and the ticking of a watch is specially well heard. The ability to hear low tones (as of the human voice) is not always improved at first, but develops gradually. I have observed that with the increase of hearing for low tones there was a corresponding decrease in the hearing of high tones.

Some persons experience a new sensation in the operated ear, lasting for a few days, or even longer. There is a consciousness of an entire change in the transmission of sound which is, to some extent, confusing. More sound altogether enters the ear, and it seems "distant" or "crude." Now and then, for the first few days, tinnitus is increased, if present before, but it gradually subsides again.

In a certain number of instances, specially in persons over forty years of age, all of the symptoms are not greatly relieved. It must be kept in mind, however, that when from chronic middle-ear catarrh deafness is steadily advancing, we know of no other way of arresting its progress excepting by the operation under consideration, and, in fact, in many cases this is the main object for which it is performed.

The sense of taste being liable to disturbance when the malleus is taken out before the incus, I usually remove the latter first, since the chorda tympani may in this way escape injury. When it is considered that the sense of taste is affected in many inflammations of the middle ear, it is surprising that it is so seldom experienced in these operations. The operation itself usually requires about five or ten minutes for its performance after the patient is anæsthetized. The details of the operation have been often given,

and would be out of place in this connection; those who may not be familiar with the literature of the subject will find full descriptions of the steps of the operation and illustrations of the instruments employed in the writer's work on the ear.¹

The drum of the ear requires no special care after removal of the drumhead, its lining membrane soon being transformed from a mucous membrane to a dry insensitive one, of a cicatricial or dermoid character.

I do not advise that cotton-wool be worn in the external auditory canal after the operation, unless the ear is naturally sensitive, or when exposed to violent winds or draughts of cold air, a precaution not always unnecessary even when the drumhead is present.

In some instances, after repair has taken place, an exfoliative process goes on for a short time in the drum or adjacent portion of the external auditory canal, giving rise to discomfort and even slight deafness when the epithelial layer thus formed detaches itself. The crust if let alone may fall out of the canal, or it may be removed with dressing forceps. During the existence of head colds some moisture may be felt in the drum; it seldom occurs and requires no other attention than the application of a little absorbent cotton-wool upon the end of a holder, by which means the parts are easily dried. Sometimes a sensation of warm air entering the drum is experienced on blowing the nose.

For a few hours after the operation, the patients should remain in a recumbent position, and afterwards restrict themselves to the room for a day or two, according to circumstances, avoiding sudden movements of the head. On the fourth day out-door exercise may be resumed. Some patients feel able to go about much sooner than this, even leaving town the day after the operation.

Regeneration of the drumhead cannot be prevented from taking place in a certain number of cases, and where the tendency is manifest it is best to let nature take her course. A new membrane sometimes develops in a few weeks, or

¹ "The Ear and Its Diseases," W. Wood & Co., New York, pp. 358-393.

the reproduction may be only partial. It occurs more frequently in patients where the best results are attainable by an operation, since the cavity of the tympanum is usually much more vascular than in advanced sclerosis where, indeed, vascularity is diminished. The newly formed membrane is found to consist of connective tissue, usually soft in texture, but sometimes thick and tough. After a time it may be easily cut away. I formerly attempted to prevent re-formation by treating the margin left with a solution of salicylic acid in "traumaticine," but from more recent experience I no longer make any application to the parts, but cut away the membrane after the application of a ten-per-cent. solution of cocaine, which renders the operation painless. Sometimes the operation has to be repeated two or even three times before the tendency ceases. The permanent removal of the membrana tympani, it may be said, requires for its success patience and gentleness in the necessary manipulations, but when this obstruction to the entrance of sound to the round window and base of the stapes is no longer present, deafness is relieved; and where rigidity of the ossicles gives rise to tinnitus, etc., these phenomena also cease with the removal of the malleus, or malleus and incus. The accomplishment of the above removes the principal difficulty hitherto encountered in this field. It is only ten years since Voltolini expressed, at the eleventh International Medical Congress, the general belief of otologists in the statement that the maintenance of a permanent opening in the membrana tympani was to him as yet an unsolved problem.

On regeneration, of course, deafness returns, but not so with the other symptoms, as a rule. When the improvement gained by the operation is thus lost, the patient often fancies that the other ear has become more deaf. Hearing returns so soon as the newly formed membrane is removed.

The operation for the cure of discharge from the ear is often even more satisfactory in its results than in catarrh of the middle ear.

BACTERIOLOGICAL EXAMINATIONS OF THE CONTENTS OF THE TYMPANIC CAVITY IN CADAVERS OF NEW-BORN AND YOUNG INFANTS.

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POLITZER, in his classic work on otology,¹ speaks as follows of the frequent diseases of the middle ear in new-born infants: "I cannot agree with those authors who explain the muco-purulent fluid so frequently found in the middle ear in new-born infants as the product of pathological inflammation, since it seems to me impossible that nearly two thirds of the new-born should suffer from a mucous or purulent inflammation, and I am rather inclined to regard these masses as the degenerated products of the foetal gelatinous tissue in the middle ear."

A great many authors, among them Wreden, v. Tröltsch, Parrot, Renaut, Barety, Gellé, Hartmann, and Steiner, have described in new-born and young infants, diseases of the middle ear of an apparently inflammatory nature. Many of them do not hesitate to connect these diseases with actual inflammatory conditions.

Bacteriological examinations recently made by Netter, seem to support this view.

Netter² found constant changes in the middle ear in a series of twenty autopsies made on infants from nine days to

¹ German edition of 1887, p. 274.

² Société de biol., April 20, 1889.

two years of age, and in eighteen cases he found the streptococcus pyogenes thirteen times, the staphylococcus pyogenes six times, and the pneumococcus five times, *i. e.*, the same pathogenic micro-organisms which are found with inflammation of the middle ear in adults.

How can these facts be made to accord with the views of Politzer? How can we reconcile the morbid changes in the middle ear in new-born and young infants, with the absence of corresponding clinical symptoms?

In order to decide these questions we have thought it necessary to make bacteriological examinations of the contents of the tympanic cavity in new-born and young infants.

Our results seem of interest, since they serve, on the one hand, to confirm what Politzer had maintained on the ground of simple anatomical and clinical observations; and on the other hand, explain the apparent discrepancies between those views and Netter's experiences.

Our material for investigation consisted of ten children from the seventh month of intrauterine life to the age of one year and six months, as follows:

One foetus of seven months.

Three infants which died at birth.

Three infants which died on the fifth, eighth, and eighteenth day.

One infant which died two months after birth.

Two infants which died one year and some months after birth.

The bacteriological examinations were made from four to twenty-four hours after death. The technique was the same in all cases, and was as follows:

I. The temporal bones were removed with antiseptic precautions. The instruments were sterilized in the flame or in boiling water; sublimate was used for the hands and the temporal bones. The latter were not immersed in the sublimate, however, since this might have disinfected the tympanic cavity also.

II. A small intra-muscular vein of the mastoid region was opened, and its blood inoculated on gelatine and agar-agar having an inclined surface.

III. The cavity of the tympanum was opened from above, after the integrity of the membrana tympani had been established by the removal of the anterior wall of the external auditory canal.

IV. Through the opening in the tegmen tympani, a sterilized platinum loop was passed into the cavity of the tympanum, and brought into contact with its various parts. We then made :

a. Puncture inoculations in gelatine and superficial linear inoculations on agar-agar with an inclined surface.

b. Isolated plate cultures on agar-agar and gelatine, after previously diluting the inoculated matter with distilled and sterilized water.

c. Cover-glass preparations of the contents of the tympanic cavity.

V.—We put the temporal bones, for microscopic examinations, first into one third alcohol, then in stronger and finally ninety per cent. alcohol.

VI.—The bones were decalcified in the usual manner with nitric acid, 3.5 parts, sodium chloride, 0.75 parts, and distilled water, 100 parts.

The results of our examinations were as follows :¹

I.—Fœtus of seven months, born prematurely, dead immediately after birth. Examination twenty-four hours after death.

The cavity of the tympanum contained a reddish-yellow gelatinous mass, infiltrated with blood.

The cover-glass preparations showed : right, numerous large cocci ; left, nothing.

Cultures of the blood from a vein in the mastoid region remained sterile.

From the contents of the tympanic cavity there developed : right, the *micrococcus cereus albus* (Flügge) ; left, nothing.

II.—Child born at term, died in birth. Examined twenty-four hours after death. In both tympanic cavities there was a black mass consisting for the most part of blood.

Cover-glass preparations showed cocci and diplococci on both sides, and also short bacilli on the right.

¹ These observations were kindly verified by Dr. Bordoni-Uffreduzzi, to whom it is our pleasant duty to express our thanks.

Cultures of the contents of the vein remained sterile.

Cultures from the contents of the tympanic cavity showed: right, the *micrococcus cereus albus* and the *bacillus iridescens*; left, the *micrococcus cereus albus* and the *micrococcus subflavus*.

III.—Child dead during birth at term. Examined four hours after death. Cavities contained a small quantity of thin mucous fluid with thick yellowish-white flocculi. Preparations and cultures negative.

IV.—Child born at term, dead immediately after. Examination eighteen hours after death. Both cavities contained a gelatinous reddish mass.

Cover-glass preparations showed cocci and bacilli on both sides.

Cultures of the contents of the vein remained sterile.

In the cultures from the contents of the cavities, the following developed: right, the *bacillus fluorescens putridus*, the *bacillus fluorescens*, the *bacillus luteus*, the *micrococcus flavus tardigradus*, and the *micrococcus roseus*; left, the *diplococcus lactis faviiformis*, and the *bacillus fluidificans parvus* (Maggiora).¹

V.—Immature foetus, dead five days after birth. Examined twenty-four hours after death. Mucous membrane of the cavities swollen and red, and cavities contained a reddish-yellow fibrinous fluid of purulent appearance.

Cover-glass preparations showed: right, short bacilli and cocci; left, bacilli.

Cultures of the vein contents sterile.

The cultures from the contents of the cavities showed: right, the *bacillus aërogenes lactis*, the *micrococcus cereus albus*, the *micrococcus flavus tardigradus*, and the *micrococcus flavus liquefaciens*; left, the *bacillus aërogenes lactis*.

VI.—Immature foetus, dead twelve days after birth. Macroscopically similar to preceding case. Examined twenty-four hours after death.

Cover-glass preparations showed numerous cocci and bacilli on both sides.

Blood cultures sterile.

Cultures of the cavities showed, right and left, the *bacillus aërogenes lactis* and the *micrococcus cereus albus*.

VII.—Infant born at term, dead eighteen days later, of catarrh of the stomach. Examined twelve hours after death. Tympanic

¹ Maggiora, Contributo allo studio dei microfiti della pelle umani, etc. *Giornale d'Igiene*, Marzo, 1879.

cavities contain a small quantity of a fibrinous citron-yellow fluid.

Cover-glass preparations and blood cultures negative.

Cultures of the contents of the cavities showed: right, the *bacillus aerogenes lactis* and the *micrococcus cereus albus*; left, the *diplococcus lactis faviformis*, the *micrococcus cereus albus*, and the *micrococcus flavus liquefaciens*.

VIII.—Infant born at term, dead two months later of catarrhal pneumonia. Examined twenty-three hours after death. The mucous membrane of the tympanic cavities was somewhat swollen and red, and contained a fibrinous yellow fluid of purulent appearance.

Cover-glass preparations showed bacilli and cocci on both sides.

The blood cultures remained sterile.

The cultures from the contents of the cavities showed on both sides the *bacillus aerogenes lactis* and the *micrococcus cereus albus*.

IX.—Badly nourished, rhachitic infant, one year and four months old. The autopsy gave negative results. Examination twenty-four hours after death. The mucous membrane of the tympanic cavities was red and swollen, and the cavities contained a small quantity of a reddish-yellow fibrinous fluid.

Cover-glass preparations showed numerous cocci.

Blood cultures remained sterile.

Cultures were made only from the right side, as antiseptic precautions could not be taken with the left. Cultures showed the *micrococcus ureæ liquefaciens*.

X.—Infant one year and six months old, dead of catarrhal pneumonia. Tympanic cavities contained a reddish-yellow fibrinous fluid.

Cover-glass preparations showed: right, numerous cocci; left, a few cocci.

Blood cultures sterile.

Cultures from the contents of the cavities showed: right, the *diplococcus lactis faviformis*, the *micrococcus candidans*, the *micrococcus cereus albus*, and the *micrococcus ureæ liquefaciens*; left, the *micrococcus subflavus*, and the *micrococcus cereus albus*.

In summing up the results of these examinations, we shall separate those made on infants who died at birth or immediately after, from those made on infants which lived a considerable time after birth.

It is remarkable that the bacteriological examination of the infant of the first category which we were permitted to examine four hours after death, was negative.

In the other cases, examined eighteen to twenty-four hours after death, we found the following micro-organisms: the *micrococcus cereus albus* (very frequently), the *micrococcus subflavus*, the *bacillus iridescens*, the *bacillus fluorescens*, the *bacillus fluorescens putridus*, the *bacillus luteus*, and the *bacillus flavus tardigradus*.

In the second category we found the *micrococcus cereus albus* (frequently), the *micrococcus candicans*, the *diplococcus lactis faviformis*, the *micrococcus flavus*, the *bacillus lactis aërogenes* (frequently), the *bacillus flavus tardigradus*, the *bacillus flavus liquefaciens*, and the *bacillus ureæ liquefaciens*.

We notice that the *bacillus lactis* was found frequently in cases of the second category only.

The bacteriological diagnosis was made for each species according to the characteristics given by Flügge¹—i. e., in respect to the peculiarities of the growth of the microbes in different culture media, to their dimensions, and to their action on animals.

As is seen in the reports, no one of the microbes found is pathogenic; we have injected most of them under the skin and into the peritoneal cavity of white mice, without producing the slightest local or general reaction; the microbes are therefore certainly products of decomposition.

Our classification cannot be considered complete or definite, since great uncertainty still exists in regard to the saprophytic microbes; we have called all the species found, by the names which Flügge has given them, since they have the characteristics which Flügge has described for these forms.

In every case we found lesions in the tympanic cavity, which might be ascribed to inflammatory processes; the membranæ tympanorum were unruptured, but more or less reddened; the mucous membrane of the cavity was red and swollen; the fluid contained within the cavity was in some

¹ "Microorganismen," Leipzig, 1886.

cases bloody, and in some of a purulent appearance and fibrinous.

These lesions evidently correspond to those which other authors have seen and described in new-born infants, and which were regarded as due to severe inflammatory processes.

The results of our bacteriological examinations are of importance, since in the nineteen temporal bones of the ten cases all the micro-organisms found were saprophytic and not pathogenic.

We may therefore conclude that the changes in question, which we found constantly in the middle ear in infants, were dependent not upon actual inflammatory processes, but upon particular post-mortem changes which, under the influence of the commencing decomposition, usually affect the delicate portions of the infantile middle ear, such as the mucous membrane, the membrana tympani, and chiefly the gelatinous tissue.

According to our explanation, there is a rapid decomposition of the gelatinous tissue and the mucous membrane of the tympanic cavity; and thus Politzer's opinion, founded only on an anatomical and clinical basis, is confirmed.

If there had been a true inflammation in these cases, then almost all infants must suffer from severe inflammations, which is contradicted by daily experience.

Our conclusions seem to differ greatly from those of Netter, but on closer examination the difference is seen to be only apparent.

Netter examined eighteen infants from nine days to one year old, two of which died of meningitis purulenta, one of abscess of the lung, four of measles, four of diphtheria, and besides this fourteen had a broncho-pneumonia. In the majority of the cases which we examined, the infants died either at birth or on account of immaturity. Only three had diseases, and these were such as are not usually followed by *otitis media*. Our examinations showed further, that the contents of the tympanic cavity in infants rapidly undergo decomposition, and thus present favorable conditions for the development of saprophytic micro-organisms. It does not

surprise us then, in Netter's cases in which the infants died of severe general infectious diseases which are often followed by otitis media, that the tympanic cavities contained not only saprophytic micro-organisms, but also pathogenic micro-organisms due to the general infection.

We conclude, therefore, from our investigations, that the changes which are found very frequently in the tympanic cavity in new-born and young infants, depend in the majority of cases upon the rapid decomposition which the delicate tissues of the middle ear undergo at this age, and not upon inflammatory processes, since no pathogenic micro-organisms are found.

A CASE OF ACUTE INFLAMMATION OF THE
MIDDLE EAR WITH UNUSUAL CEREBRAL SYMPTOMS.

Clinical Report.

BY PROF. AD. BARTH, MARBURG, GERMANY.

Translated by Dr. WARD A. HOLDEN, New York.

(*With one figure in the text.*)

OF the various cases of aural disease which I have observed and treated lately in the nerve department of the Charité, in Berlin, the following seemed worthy of notice because of its very unusual course. For the greater part of the history relating to the general condition of the patient I am indebted to Dr. Siemerling. Our diagnosis was acute meningitis (probably) following an acute inflammation of the middle ear. I shall not indulge in any theoretical discussion of the case.

Max R., æt. sixteen, was admitted to the hospital December 30, 1889, in an unconscious condition. His mother stated that he had been well until the day before. December 29th his mother asked him to dance with her, and at that moment he fell, and remained unconscious up to the time of his admission to the hospital. No twitching was noticed.

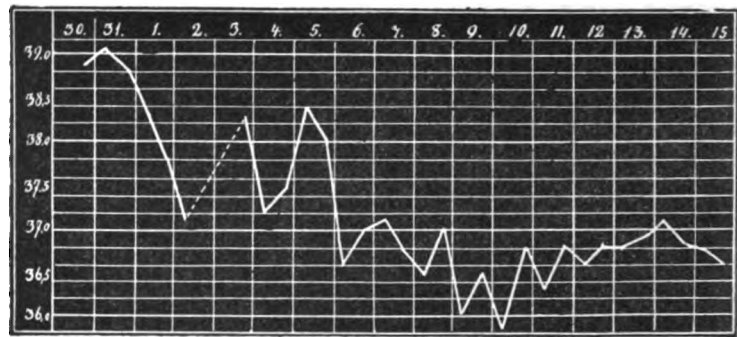
December 31st a more careful examination was made. Pulse 88, regular and strong. The patient is completely stupefied; respiration (24) is of a snoring character; the eyes are closed. The arms are flexed, the legs are frequently stretched out and then drawn back, and when they are raised passively, sink slowly again.

Since the muscles are made tense in the examination, the knee-jerk could not be tested. He reacts with expression of pain when pricked with a pin, and moves freely. The head deviates toward the left side, but is freely movable. The pupils are of equal width and average size, and react promptly to light. There is no discharge from the ears. The lower jaw may be separated from the upper without resistance. The tip of the tongue lies between the teeth, and shows the impressions of the teeth, but has not been bitten. The lung shows no dulness in front or behind; low down on both sides a humming respiration is heard, but no râles. The urine has passed involuntarily, but no stools. In the evening the condition was the same. Patient had taken no nourishment, and the urine had not been passed again. Pulse 88, regular and strong. Knee-jerk obtained on both sides.

January 1, 1890.—Pulse 80, regular and strong. Patient passed urine in the night. Has not spoken. Some fluid nutriment has been taken.

January 2d.—The condition is the same; coma continues. The patient is restless. No stiffness of the neck; repeated grating of the teeth. He was fed morning and evening by means of a tube. In the evening he vomited shortly after being fed. He emits growling sounds. Knee-jerk present both sides. Pulse 84 and strong. Ophthalmoscopic examination by Dr. Uhthoff revealed nothing. Pupillary reaction normal.

January 3d.—Pulse 84 and regular. Condition unchanged. To-day a discharge from the left ear, partly clear, partly yellow, is noticed. At Dr. Siemerling's request, I examined the patient and treated him until he was discharged. The patient is comatose, and lies with his eyes closed. There is no trace of paralysis or contracture. There is prompt reaction when he is stuck with a pin. The tongue is thickly coated; marked fetor *ex ore*. The right ear is apparently healthy. Exteriorly the left ear shows nothing in particular. The mastoid process is free, not swollen, and not sensitive to pressure. When strong pressure is made on any portion of the cranium, the face is contorted and the head drawn away. The left auditory canal contains a sero-purulent pulsating secretion, mixed with small bits of epidermis. After being cleansed, the bony canal is seen to be reddened and somewhat swollen. There is a marked bulging of the posterior superior wall of the bony canal and of Schrapnell's membrane. The examination with the speculum is undoubtedly painful.



TEMPERATURE CURVE.

[The recording of the temperature of the second evening and third morning was neglected.]

Therapy: incision of the swollen part down to the bone; leeches to the mastoid process; ice-bag. Pulse 96.

January 4th.—Pulse, 96 morning; 92 evening.

January 5th.—Pulse 96.

January 6th.—Pulse, 92 morning; 72 evening. The coma is not so deep since yesterday morning, and the patient opens his eyes when called to. When an attempt was made to feed him with a spoon, he swallowed a few mouthfuls, and then sank back into a comatose condition. He was therefore still fed with a tube. Urine and fæces passed. In the evening he is again able to swallow; opens his eyes and looks about, but does not speak. When his head is moved passively, he distorts his face. There is no expression of pain when the head is percussed, but pressure on the left mastoid process elicits it. Pressure on the right mastoid process also causes distortion of the face. The secretion was fairly abundant for an acute inflammation of the middle ear, was bloody at first, but has now become less. The redness and swelling are also less marked.

January 7th.—The pulse for the following days varied between 70 and 80.

January 23d.—The patient sits upright in bed, and looks about. His face assumes an anxious expression whenever any one approaches or addresses him. One day, suddenly and without cause, he began to belabor the patient in the next bed with a boot which lay near. He does not speak, and seems not to hear what is said to him. He is now out of bed and goes about the room, his

actions giving one the impression that he is deaf and dumb ; he follows everything with his eyes, but stares at any one who addresses him and draws away. Involuntary passages are less frequent. The patient has said yes and no a few times. Lately he has become more approachable, and gives his hand to the physician of his own accord. To-day he replied to a salutation, spoke well, and answered questions. Then suddenly he stopped, shook his head, and refused to speak further. There has been no secretion from the left ear for several days, but the psychic condition of the patient prevents an examination of the hearing power. To-day examination shows fresh blood dried on the posterior margin of the membrana tympani and in the auditory canal. The patient has recently put his finger into the left ear very often, and has probably wounded himself.

February 21st.—The condition of the patient has been good for more than fourteen days. He was dismissed cured to-day. He remembers very indistinctly the events which happened at the beginning of his disease. He remembers that he was at a Christmas gathering, and feeling well. His mother wished him to dance with her ; he declined, however, as he soon became dizzy and could not dance. He suddenly lost consciousness, and only recovered his senses after he had been a considerable time in the Charité. The patient is now friendly and talks well. There is no headache, no dizziness. The left membrana tympani is healed, and the hearing on both sides is normal.

CROUPOUS RHINITIS.

By GREVILLE MACDONALD, M.D., LONDON,

PHYSICIAN TO THE HOSPITAL FOR DISEASES OF THE THROAT, LONDON.

THAT a croupous form of inflammation should attack the mucous membrane of the nose, as well as that of the bronchial tubes or the larynx, can be a matter of no surprise to the pathologist, although as a clinical fact it has only very recently attracted the attention of experts. Even apart from the analogous condition occasionally found in the bronchial tubes, it would cause but little surprise to the rhinologist, seeing that he not infrequently actually, although inadvertently, induces the precise condition. This occurs subsequently to the application of the electric or other caustic to the rhinal mucosa, when, on the day following the application, large masses of false membrane, firm, though transparent and finely fibrous, may be found extending for wide distances from the spot actually cauterized, sometimes almost blocking up the fossæ. As the cauterized membrane is approached, the false membrane becomes firmer and more closely adherent, until over the slough itself it resembles the false membrane of diphtheria, in that it cannot be removed without a certain amount of force and the production of hemorrhage. In this consideration one can but recall the observations of Senator on the relation of croupous to diphtheritic membranes, the difference between the two, according to him, consisting merely in the different intensity of the inflammatory process in the two cases, whatever may be the initial cause of the inflammatory action. He says: "There is never any sharp boundary line between these

processes; and in particular it is in many, indeed, in most, cases quite impossible to say where the fibrinous superficial exudation, the croup membrane, ceases, and the pseudo-membranous slough, the diphtheritis, begins."¹ He then proceeds to draw an analogy between this condition of affairs and that encountered in the inflammation produced on the skin by the actual cautery: "Where the action has been most energetic you find a slough; beyond that an exudation in the form of a bladder or vesicles, consisting of pus corpuscles and an albuminous material, which coagulates on exposure to air on opening the vesicles, and which is therefore fibrine," etc. He then accounts for the different appearances in inflammation of the skin and of the mucous membrane by the difference in anatomical structure; but had he had the opportunity of witnessing the changes following the application of the actual cautery to the mucous membrane of the nose, the correctness of his analogy would have been even more forcibly presented to him. In fact, the exudation produced after the application of the electric cautery and that formed in the course of an attack of croupous rhinitis are identical both in microscopical and macroscopical appearance. Consequently, seeing that the possibility of these cases being diphtheritic may be excluded, we are justified in assuming that the croupous exudation, which sometimes occurs as the result of an acute rhinitis, but expresses the greater intensity of the inflammatory action, exhibited as a consequence of ordinary cold-taking in certain individuals peculiarly predisposed. So much may suffice for a definition of croupous or, as it is sometimes called, pseudo-membranous rhinitis.

There does not appear to be any special constitutional factor in the development of the affection. We find it in the anæmic and the full-blooded equally with the neurotic. All that can be affirmed in this connection is that one attack predisposes to another; from which it would appear that idiosyncrasy is largely responsible for the peculiar manifestation of the inflammatory attack. Probably climatic cir-

¹ German Clin. Lectures, 2d Series, New Syd. Soc., 1877. Art. "Synanche Contagiosa," p. 415 *et seq.*

cumstances contribute to the etiological factors, since the disease appears to be more frequent in America than in Europe. Nor is this surprising when one remembers the greater prevalence in the former continent of all forms of nasal inflammation.

All observers appear to be perfectly satisfied that croupous rhinitis is quite unassociated with diphtheria, although certain authorities have described cases as occurring during epidemics of the latter. But such cases must obviously be excluded, as they should be described rather as nasal diphtheria. Clinically the membrane differs in its objective appearances from the diphtheritic in that it is usually not adherent, and may be removed without producing any hemorrhage or abrasion of the surface. Moreover, the mucous membrane, so far as the writer's observation of five cases instructs him, may be, though greatly swollen, rather paler than the color of health; it may have, in fact, a somewhat œdematous appearance. This croupous inflammation of the nasal mucosa not uncommonly results, as has already been remarked, artificially, subsequent to electric or other cauterization of different regions of the nose; sometimes extending over wide surfaces, the limits being at considerable distance from the site of the application. This fact seems to indicate that the membranous production is the result of an unusually intense inflammatory action. In the idiopathic croupous rhinitis the extent of the patch may vary from the size of a small pea or even smaller, to such a size that the whole of the nasal and naso-pharyngeal mucous membrane is covered with a thick, gelatinous but firm membrane, which may be withdrawn from the nose with forceps and without the production of any hemorrhage. On the posterior wall of the pharynx may be seen round or lenticular isolated patches lying on an unnaturally pale base. These, though more adherent than the membrane in the nasal fossæ, can be peeled off with a brush or pledget of cotton-wool, leaving a surface somewhat heightened in color, and occasionally slightly hemorrhagic. Indeed there appears to be no pathological reason why in the same case the membrane should not be merely croupous in part of its ex-

tent, though here and there adhering close enough to involve some superficial sloughing; in which event it must closely resemble a diphtheritic membrane. Sometimes the affection is confined to the pharynx and naso-pharynx. In one of two such cases observed by the author the disease lasted ten weeks, without any elevation of temperature or other disturbance of health, the only complaint being of the slight soreness. In this case the patches were regenerated from day to day after removal, while they indicated no tendency to involve other regions, or even to extend their own dimensions.

The subjective symptoms are usually those of an ordinarily severe rhinitis, the temperature being raised to 100° or 101°. There is more or less occlusion of the nose, with a profuse flow of watery mucus, pieces of membrane being occasionally extruded on blowing the nose. In some cases, especially perhaps where the production of membrane is not great, there is severe paroxysmal sneezing, which may sometimes be allayed on the removal with forceps of a small portion of false membrane. Patients who have once had an attack appear in some cases predisposed to another, while in others there is a certain chronicity in the course of the symptoms. To the latter point Dr. Potter, of Buffalo, has referred.¹ In one of the author's cases there appeared at each attack, the patient having had a great number, a wide patch of erythema, extending across the bridge of the nose.

Schuler has noticed the association of a membranous rhinitis with facial erysipelas.² After the removal of any portion of the false membrane, there is a strong tendency to its regeneration. The duration of the affection, as will be gathered from the preceding remarks, is very variable. Potter, who has recorded the largest number of cases, gives the average as three weeks. But occasionally cases run a chronic course.

As far as treatment is concerned, there is little to suggest beyond such remedies as are likely to be of service in an ordinary case of acute rhinitis. Hot fomentations to the

¹ *Journ. of Laryng.*, March, 1889.

² *Jahrbuch für Kinderh.*, 1871.

nose and eyes have appeared to be of special service, while irrigations of weak solutions of borax have a soothing effect. The membranes, if extensive, should be removed as fast as they accumulate; and in cases where they are so large that they cannot be extruded by blowing the nose, they should be removed with forceps. Cocaine appears to have neither anæsthetic effect nor power of contracting the swollen turbinated bodies in these cases—a fact noted by other observers. This anomaly has also been frequently noticed by the writer in cases of sharp inflammation following the electric cautery or other operation.

Potter mentions the various remedies he has employed, but concludes his remarks on treatment by asserting that he does not think that by any means the duration of the affection was shortened. Nevertheless he has found great relief experienced by the introduction into the nasal fossæ of dry tampons of cotton-wool. These, absorbing the excessive mucus, swelled, and, by their pressure on the erectile tissue, effected that reduction in size which the cocaine was unable to accomplish. "Often a series of pellets was introduced one after another, each being left *in situ* for five minutes or more; and this plan seemed to work very well" (*loc. cit.*).

The literature of the subject is not extensive, many of the cases recorded as pseudo-membranous rhinitis being obviously instances of diphtheria of the nose. The best account has been given by Potter, of Buffalo, to whose paper on the subject ample reference has already been made. But in certain respects his account differs from that given above, so far in fact as he asserts that the membrane cannot be removed without leaving a bleeding surface. Whether this be so or not in any particular case depends, in all probability, on the intensity of the inflammatory action. Gluck¹ has also recorded some cases and Chapin² has given us a good *résumé* of the subject.

¹ Gluck, *Med. Record*, April, 1889.

² *New York Med. Jour.*, 1890.

MEASUREMENTS OF THE HEIGHT OF THE CUPOLA OF THE TYMPANUM.

By C. KLINGEL, BERLIN.

Translated by Dr. WARD A. HOLDEN, New York.

(With one figure in the text.)

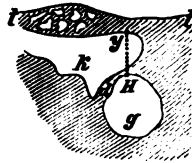
I HAVE lately had the opportunity of studying 47 macerated specimens of the petrous portion of the temporal bone, from Dr. A. Hartmann's collection, and have paid special attention to the height of the so-called cupola of the tympanum. It may be of interest to present these measurements, since the subject has not been much treated of in German literature.

Samuel Sexton was the first to describe the cupola (Trans. Amer. Otol. Society, vol. iii., p. 387, 1882-1887). He spoke of certain inflammations of the middle ear which affect the atticus, as he called the cupola, and which may appear in an acute or a chronic form. He gave a detailed description of the atticus in its relations to the rest of the tympanum, the external auditory canal, and the surrounding bony parts. This description is in part a citation from Leidy (*Science*, May and June, 1883), and in part the result of his own investigations.

Politzer, in his text-book, described as the upper part of the drum cavity, that space above the membrana tympani which arises from the difference in height between the upper bony wall of the external canal and the upper wall of the tympanum, in which space lie the head of the malleus and the body of the incus. According to Politzer the

distance between the roof of this cavity and the head of the malleus is on an average 5-6 *mm*. Hartmann (" Diseases of the Ear," Berlin) suggests the name "cupola" for this cavity.

If the petrous portion of the temporal bone be divided by a vertical section at the inner margin of the roof of the external canal, or a little external to this, we get the appearance shown schematically in the figure. In this case the section lay somewhat more external to the inner termination of the auditory canal, and the latter is seen to be separated from the cupola by a thin plate of bone. The section passed through the cupola, since this lies not only directly above the tympanic cavity, but also extends a short distance outward above the canal. Behind the cupola is the entrance to the mastoid antrum, which entrance passes backward and outward. The transition to the Eustachian tube anteriorly is not seen, since this passes forward and inward. Above



the cupola lies the tegmen tympani, which in this case is very thick, measuring at least 1 *mm* and consists posteriorly of spongy tissue; *t* is the tegmen tympani, *k* the cupola, *s* the roof of the external auditory canal, and *g* the external auditory canal. If the highest point of the arched roof of the external canal at the top of the Rivinian segment be taken, and a line from this point (*x*) be drawn vertically upward to the under surface of the tegmen tympani, a second point (*y*) is gotten. The distance between these points *x* and *y* varies in different individuals.

The measurement of the distance between *x* and *y* in the 47 specimens was made in the following manner. A number of pieces of brass wire were bent at a right angle at different distances from the end, so that the bent portion had a length varying from 1 to 8 *mm*. These wires, beginning with the smallest, were successively laid at the internal end of the auditory canal, until one was found whose bent portion just

touched the tegmen tympani. In this way I found the value of the line *xy* to be 3 *mm* in 6 specimens; 3-4 *mm* in 6; 4 *mm* in 17; 4-5 *mm* in 9; 5 *mm* in 7; and 5-6 *mm* in 2.

4 *mm* was the length most frequently found, and 5-6 *mm* was seen in but 2 specimens. This is at variance with Politzer's statement that the average distance between the head of the malleus and the roof of the upper part of the drum cavity is 5-6 *mm*.

An instrument bent at a right angle, introduced into the cupola at the highest point of the Rivinian segment, could easily reach the tegmen tympani if the bent portion had a length greater than 3 *mm*. When it is remembered that the tegmen tympani is often as thin as paper, and shows fissures of varying width, it is seen that injury to the dura mater or to the brain itself is not impossible. The danger is less when the bent portion of the instrument is not carried into the cavity vertically, but directed backward; for as the figure shows, the distance between the upper wall of the auditory canal and the tegmen tympani increases posteriorly. The knife-shaped instrument used in Schwartze's clinic for removing the incus, and the instrument which Sexton has recommended for the same purpose (*Trans. Amer. Otol. Society*, vol. iii., 1882-1887), have a bent portion 4-5 *mm* long, and might injure the dura mater if the operator were not careful to turn the instrument immediately backward.

But the danger is not altogether avoided in this manner, since the narcotized patient may suddenly move his head, and thus the instrument be thrust forcibly against the tegmen tympani, against the will of the operator. And in the living it is never known in a given case whether the tegmen tympani be relatively thick or quite thin, whether its substance be compact or spongy, and whether fissures exist or not.

In conclusion I would express my thanks to Dr. Hartmann for suggesting this subject to me, and for kindly placing his specimens at my disposal.

A CASE OF FOREIGN BODY IN THE TYMPANUM.

BY DR. B. MANDELSTAMM, OF KIEW, RUSSIA.

Translated by Dr. J. A. SPALDING, Portland, Maine.

THE case of a foreign body in the tympanum, published by Dr. Elizabeth Sargent in these ARCHIVES, vol. xvii., p. 102, is of great interest, not only on account of the ingenious method in which it was removed, but as a proof of the resistance of the tympanic mucous membrane to impacted foreign bodies, and the various attempts made to remove it. In this case of Dr. Sargent's, the foreign body remained in the middle ear more than a year; many attempts were made to remove it, and all of them without any marked reaction on the part of the deeper tissues of the ear, the meninges, or the general health of the patient.

It is true, on the one hand, that many cases have been published in which a foreign body has remained in the middle ear for a week or two, or an entire month, has then caused meningitis, and severe constitutional symptoms, and even death.¹ Yet, on the other, there have been but very few cases reported in which a foreign body has remained quiescent in the tympanum for any great length of time. Even so skilled an aural practitioner as Schwartz, regards such cases as an extreme rarity, although he cites Voltolini's case of a drainage tube remaining in the middle ear five years.²

¹ The most extraordinary case of this nature was reported by Prof. Bezold, *Berlin. klin. Wochensh.*, 1888, No. 26, p. 524.

² Schwartz, *Chirurg. Krankheiten d. Ohr.*, p. 244.—I have discovered a case of Hedinger's (these ARCHIVES, vol. xv., p. 244) in which a molar tooth remained in the ear of a patient fifteen years. But as this foreign body only

For these various reasons I feel justified in reporting the following interesting case in full detail :

In July, 1888, I first saw a boy of eleven, into whose left ear a cherry-stone had been thrust by a comrade whilst at play. The physician who had been called endeavored (without a mirror) to remove the foreign body with a pair of forceps, but without any other result than to excite profuse hemorrhage and excessive pain. A few days afterward the boy was brought to me. I was unable at first to make a critical examination of the meatus, as it was completely filled with coagulated blood. After this had been removed by syringing, and the passage dried with cotton, I saw a rose-colored surface at the inner end of the swollen and narrow meatus, and completely filling the annulus tympanicus. As it felt stony to the probe, and was quite immovable, I saw at once that it was the convex surface of the cherry-stone that had been pushed completely into the tympanum. The *Mt* was invisible. The good ear carefully closed, the boy could hear with the left ear a loud voice at 60 cm.

The boy's general condition was excellent ; but the parts were so much swollen, that I at once directed instillations of alcohol to reduce this state of affairs. After a few days, the swelling had decreased so perceptibly, that a small opening was visible between the foreign body and the annulus, both above and below, whilst the entire surface of the foreign body was visible. Pus was welling through the fissures above and below.

The foreign body was now so firmly wedged into the annulus tympanicus that it could not possibly be removed with the syringe. I passed injections of water through the Eustachian tube, and a few drops of water made their way through into the external meatus, but without starting the cherry-stone. The boy was so restless when I endeavored to remove the stone, first with a probe, and then with an extraction hook, both from above and below, that I was obliged to resort to chloroform, intending to loosen the auricle from behind, in order to prevent the suppuration from extending into the deeper portions of the ear, and to seize the foreign body with the same forceps that I had previously employed. The first step in the operation was carefully performed without any

partially projected into the tympanum through a perforation of the *Mt* whilst the greater portion, according to the description, lay in the meatus externus, yet this case, strictly tested, does not come under the category of foreign bodies wholly in the tympanum.

accident, and the auricle rolled over and forward. After the abundant hemorrhage had been stilled, I succeeded in introducing the forceps and grasping the offender with both branches. Unfortunately, I then employed too much force, and so split the stone into fragments. But as I succeeded in bringing away a large portion of the hard shell, and then several splinters, and finally washed out with the syringe the entire contents of the pit, I thought that only a little of the substance had been left behind. And as it was rational to suppose that the subsequent suppuration would extrude whatever was left, I made no further search, but terminated the operation by suturing into place the auricle, which soon united by first intention. The suppuration, however, still persisted, and as the father could not longer remain in Kiew on account of his business affairs, I dismissed the patient with directions to have the ear syringed daily and abundantly with a boric acid solution, and to continue the instillations of alcohol until he could come back with the boy.

I did not see the patient for six months. The suppuration had persisted without any intermission, though it had varied at times in amount. The boy had been perfectly well, and had not complained of any pain in the ear. The treatment had been carried out intelligently, and as directed, ever since the previous visit. Examination of the ear showed it entirely free of swelling, so that the meatus and tympanum could be thoroughly examined. I plainly saw in the tympanum an apparently small bit of the old foreign body, with its edge directed upward, whilst the lower portion was seen to extend to the floor of the tympanum. I introduced the forceps experimentally, succeeded in grasping the fragment, but on attempting to withdraw it, it broke off from the rest, and only the small portion between the teeth of the instrument came away. The boy would not let me introduce the forceps a second time, and as the father was compelled to leave, the two departed for home the same day on which they had arrived.

It was October, 1889, before I saw the patient again in the best of health, but with some swelling at the inner ends of the meatus, near the annulus, and on it a small projecting granulation. The pus in the meatus was very offensive to the smell. I snared off the granulation, cauterized it deeply with chromic acid, and applied an iodoform tampon. This I continued for several days, and then under narcosis incised the constricted meatus, and so far as was possible cleansed the tympanum of its granulations with a

small sharp spoon. The tampons were continued for an entire week in order to enlarge the narrow meatus. At the end of this time the constriction was so widened that the remnant of the cherry-stone could once more be seen. Now, as I did not wish to chloroform the boy for the third time, I endeavored to remove what was left of the foreign body under the use of cocaine. I instilled into the meatus several drops of a 20 % solution, and after waiting about twenty minutes I passed a bent hook behind the free edge of the shell, and by a twisting motion upward and outward I succeeded in removing it. Great was my astonishment to find that the foreign body was the LARGER half of the cherry-stone. It had lain with its convexity on the floor of the tympanum, and behind the lower segment of the annulus. Only the free edge of the surface turned toward the observer rose unto sight. I had without any presentiment of the locality of the stone passed the hook into the concavity, and so raised it up and out of its long resting-place. This large, hard, angular bit of shell had therefore remained one year and three months in the tympanum without causing any marked reaction in the deeper regions of the ear or in the meninges, or without exciting any reflex symptoms in any other parts of the nervous system. And more than that, within a week after the removal of the shell, the *Mt* began to regenerate, and at the end of a short time only a minute perforation was visible. To be sure, the regenerated tissue did not resemble the normal tissue of the *Mt*, being highly cicatricial in its appearance, blue, and totally opaque. Nevertheless the hearing was soon so much improved that the boy could hear ordinary conversation at 6 m, whilst before he could hardly distinguish the same at 40 cm. Unfortunately, he left town unexpectedly, and without notifying me of his intended departure, so that I am unable to report the condition and the final result of the regenerative process in the left tympanum.

SOME POINTS CONCERNING THE OPENING OF THE MASTOID PROCESS.

BY TH. HEIMAN, WARSAW.

Translated by Dr. F. E. D'OEKCH, New York.

I PURPOSE in this paper to call attention to certain points, namely: in what cases and when the mastoid process should be opened. I shall confine myself to a brief presentation of the results of my experience on this subject.¹

This difficulty and uncertainty not only depend upon the fact that we have as yet no sure indications for all cases, but also upon the further one, which to me seems the most important reason, that we are not always able to diagnose the pathological condition which demands the opening of the mastoid process, and so it sometimes happens that the operation is performed when it was not sufficiently indicated; and, on the other hand, the operation is not per-

¹ The aural ward at the military hospital, Ujasdoff, which has been in my charge for the last eleven years, can accommodate 50-60 patients. During the winter months the daily average rises to 100-150. The patients are divided into two classes, those who undergo treatment and those who are received to determine the nature of their affection (men subject to military duty, who, on account of an uncertainty of diagnosis, or the suspiciousness of their disease, are sent from the different districts of Warsaw County [Poland] for final determination of the character of their disease). The average number of these patients for the year is about 1,000. Besides these, policlinical patients come under my care, *i. e.*, patients who are under treatment in different wards of the hospital for other diseases, and where the primary affection, for instance, typhoid fever, etc., is attended or complicated with aural disease. The number of these patients is about 400 a year. The deaf-mutes (subject to military duty) are also sent to me for examination; their average number for the last two years has been about 80. I do not include the patients of my own polyclinic (about 1,200 a year), nor those of my private practice, as accurate observation of the disease from beginning to end is often difficult or impossible, as many patients frequently change their physician.

formed in cases in which it not only might have proved of great benefit, but even saved the patient's life.

At present the indications for the operation may be summed up as follows :

1. In acute purulent otitis media, complicated with inflammation of the mastoid process, when the inflammatory symptoms, like the swelling of the skin, the fever, the persistent and severe pain, do not yield to antiphlogistic treatment (ice, leeches) and Wilde's incision.

2. In acute and chronic purulent otitis media, when the escape of the secretion is impeded by granulations in the middle ear or stenosis of the external auditory canal, causing recurrent swelling, redness, and painfulness of the skin of the mastoid process, or in the absence of these objective symptoms, when there is a suspicion of inflammation of the mastoid process.

3. When the mastoid process is apparently healthy, but the removal of pus or cholesteatomatous masses through natural channels is impossible and symptoms dangerous to life manifest themselves.

4. In congestive abscesses and fistulas in the region of the mastoid process.

5. In persistent, continuous pain in the mastoid process, yielding to no other treatment, though there is no retention of pus and the mastoid process seems healthy, especially, however, when it seems sensitive to pressure.

6. As a prophylactic operation, in symptoms, present or absent, of retention of secretion and inflammation of the mastoid process, when death is to be feared on account of imperfect disinfection.

In the course of time I became convinced that these six points do not cover all the indications for opening the mastoid process ; they must be extended, and some of the indications must be changed. I find that the operation is also indicated in the following cases :

7. In acute purulent otitis media, in which there is no inflammation of the mastoid process and no retention of secretion, but in which the discharge is very profuse, does not yield to the usual methods of treatment after a certain time

(2 to 3 weeks), or even increases, especially, however, when fever supervenes.

8. When there are distinct symptoms of inflammation of the brain and the meninges, although in such cases the chances of success are very doubtful.

The changes in the indications, which I would propose, affect points 4 and 5. To the indication for opening the mastoid process in congestive abscesses and fistulas in that region, I would add: when they cannot be cured within a certain time, and the general condition is satisfactory, and the patient is free from any diathesis or dyscrasia. An abscess of course must not remain unopened. The fifth point should be extended as follows: and also in the absence of pain in the mastoid process, and in free discharge of the secretion, when in acute and chronic otitis media there is continuous though not high fever (38.2° – 38.6° – 39°), which does not yield after some time to local or general treatment.

As to the time when the operation shall be performed, the opinions of aurists are divided. Some advise to do it as early as possible, others not until threatening symptoms begin to manifest themselves. In the first years of my practice as an aurist I held to the latter view, not so much from conviction as from necessity. As the aural ward of the hospital at that time was a dependency of the surgical department, and the ideas of the significance and importance of aural diseases were erroneous and vague, and as I was entirely dependent upon the surgical department, it came about that the mastoid was only opened in desperate cases, and then only when pyæmia, septicæmia, meningitis, or encephalitis had existed for several days. Of course operations under such circumstances were rare and always unsuccessful; and consequently it was concluded that the operation was an unnecessary torture to the patient, who must die under all circumstances.

In the course of time I succeeded in overcoming the prejudice against opening of the mastoid process and in obtaining entire independence for the aural ward. Experience had taught me the uselessness of late operations, and convinced me of the advantages of early operative interference,

not only in cases for which the indications are laid down in the handbooks, but also in those which I have previously mentioned. From 1879 to 1885 I have opened the mastoid in six cases in the hospital, and twice in private practice. Of these eight cases, I lost seven. From 1885 to 1889, inclusive, I operated on forty-five cases, in twenty-nine at the hospital, and on sixteen in private practice. Among these forty-five cases, I only lost one, and he had a fully developed septico-pyæmia when he came under my care. Among these forty-five cases, there were eleven that were operated upon under indication number 7, and the extension of indication number 5, which I have proposed. In 1890 I have opened the mastoid process to the end of July in fourteen cases, in ten of them at the hospital, and in four in private practice; in four I operated under indications 7 and 5. Of these fourteen patients I lost three: one in my hospital practice, who came under my treatment on the sixth day in an advanced stage of meningitis and extensive caries of the tegmen (autopsy); one in private practice from œdema of the brain, which developed on the tenth day after the operation on a tuberculous person; and one, also in private practice, who had been healthy until his aural affection developed, and in whom caries of the mastoid process and the whole pars squamosa set in, after an injury (blow on the head) followed by purulent otitis media; the mastoid process was opened and the carious bone removed, exposing the dura mater to a large extent, but tuberculosis of the lungs rapidly developed, and the patient died.

The possibility of encountering unforeseen complications during the operation, among which opening of the transverse sinus was especially feared, and the fact that many cases recover without an operation, have probably been the reason why several aurists advised a late operation. Injury to the transverse sinus, which may occur in consequence of anatomical anomalies, is a rare event according to my view, and when it does occur, the result is generally not serious, as a glance at the reports of such cases shows. Among all the cases I have operated on myself (67), as well as those at which I assisted, this accident happened once, at the hospital.

But even in this case, injury of the transverse sinus in the strict meaning of the phrase did not take place, because in this patient there was a curious fistula at the upper margin of the mastoid process which led to the dura mater, and while I was carefully exploring the wound with a probe, a broad stream of black blood suddenly spurted forth. This case terminated favorably; in the first days there was high fever (40.9°), otherwise the course was normal. That the labyrinth may be injured in opening the mastoid process cannot be denied, but one must have been somewhat careless to reach it.

It is undoubtedly true that many cases recover without an operation, especially those which come under indication No. 7. This, however, does not justify long waiting, or, what is worse, the giving up of the operation. When we consider that in view of our exact knowledge of the anatomical conditions, exact execution, and, what is most important, our present methods of antiseptic bandaging, it cannot be considered dangerous; and, on the other hand, as it is impossible to disinfect the tympanic cavity thoroughly, as we are not always able to decide when a fatal complication begins to develop, and as such cases often end in death, either directly by causing general infection or acute cerebral trouble, or indirectly by becoming chronic and leading to caries, cachexia, tuberculosis, etc., the end of which is death. I believe that not only we must fully agree with Schwartze in operating as soon as possible, but also that we must extend the indications in the direction I have explained.

The most important reason which leads me to operate in indications 7 and 5 is the general surgical principle: where there is an accumulation of pus, and the conditions for evacuating it and keeping the cavity clean are unfavorable, we must endeavor to remove these obstacles, in order to bring about recovery and prevent complications. When, therefore, in acute purulent otitis media the suppuration does not cease, or even increases, or when moderate suppuration from the ear in acute and chronic otitis is attended with continuous moderate fever, it will be readily seen that in such cases the pus is not sufficiently discharged, or that

our remedies, applied through the tympanic cavity, do not reach the seat of the disease or do not act sufficiently. What else should then be done except to open the mastoid process? In this manner thorough disinfection of the tympanic cavity is made possible, and the removal of the products of disease is facilitated. I believe that the operation brings about not only a cessation of the affection of the mucous membrane, but also of the bony walls of the middle ear, which is freed from the pent-up pus.

In proof that the opening of the mastoid process, in cases in which I consider it indicated, is indeed called for, I will cite two clinical histories of patients whom in the last weeks I treated almost simultaneously :

(1) The Cossack Z. was attacked with croupous pneumonia, and after recovery from it, with severe purulent otitis media of the left ear, attended with high fever. The discharge was very profuse, the mastoid process not painful, its skin normal. The middle ear was syringed out daily with a weak solution of corrosive sublimate¹ through the external meatus and the Eustachian tube, and after a week the discharge had almost entirely ceased ; the high fever had subsided on the second day after the beginning of this treatment, and the general health of the patient rapidly improved. The syringing through the Eustachian tube was then discontinued, and I confined myself to disinfection of the ear through the external meatus. Ten days later the discharge suddenly increased without any known cause, the temperature rose to 39.5°, the general condition remained satisfactory, and nothing abnormal could be found about the mastoid process, either subjectively or objectively. The same treatment as before was instituted, and as I observed no improvement after two days, I decided to open the mastoid process the following day. But what a change occurred in these twenty-four hours ! I found the patient half-unconscious, mumbling to himself, and tossing about in bed almost constantly ; temperature 40°, pulse 120, rapid and feeble. Nevertheless, in spite of these pyæmic symptoms, I was ready to open the mastoid process, but after a consultation with the other physicians the patient was declared unfit for an operation, and

¹ I have used this solution of sublimate for three years instead of solutions of boracic acid, chloride of sodium, or bicarbonate of sodium. Since that time I have had no case of erysipelas in my ward, while formerly 3-5 cases annually were complicated with it.

transferred to the inner ward by order of the chief-of-staff. This patient died two days later, and the autopsy revealed the following: a fresh thrombus in the transverse sinus, infarcts in the lungs and in the spleen, and secondary meningitis of the convexity of the brain. In the middle ear and in the mastoid cells a large quantity of pus. The mastoid process hyperæmic.

(2) The artillery soldier L. came to my ward a week after the former patient, with very severe purulent otitis media of the left ear, which had begun four days previously without any known cause. The usual treatment, such as syringing through the Eustachian tube and the external auditory canal, instillations of a warm 4-per-cent. solution of boric acid, application of tincture of iodine to the mastoid process, failed to have the slightest effect upon the quantity of the discharge. This continued for two weeks; the general health of the patient was very good; there was not the slightest reaction on the part of the mastoid process. Suddenly the temperature rose to 41.2° , preceded by a severe chill. I at once proceeded to open the mastoid process. The cells were only found hyperæmic, and it was not until I had entered the antrum that I found a drop of pus. The wound was bandaged with iodoform gauze. The very same day the temperature fell to 36.5° , and remained at that point to the end of the disease. The suppuration ceased on the second day after the operation. The wound healed in six weeks, and the ear became entirely normal.

Under the indication of abscesses and fistulas in the region of the mastoid process, I have stated that in such cases the operation should be delayed. The only reason I can give for this is my own experience. I became convinced that spontaneous recovery takes place in many such cases without any injurious consequences. I have made the observation, and not even rarely, that fistulas upon the mastoid process, which penetrate into the bone affected with partial caries, may heal before it had been decided to remove the carious bone. Sometimes this takes place in a few days.

While I am of the opinion that the mastoid process should be opened as soon as possible and the indications be extended, I also believe that the operation is not contra-indicated when symptoms dangerous to life have developed.

Schwartz thinks that even when there are distinct septico-pyæmic symptoms the operation should be performed, as even at this stage recovery sometimes takes place—a statement which I can confirm from my own experience. I also became convinced that, even when distinct symptoms of cerebral inflammation have developed, the operation may still prove useful. Thus far I have observed but one such case, but it is sufficiently instructive to prove that even in such cases the patient should not be left to his fate, and that they form a special indication for opening the mastoid process. On account of its importance, I will briefly give the clinical history.

The dragoon J. P., aged twenty-five, came to my ward with an acute purulent otitis media of the left ear, severe left-sided headache, and high fever (39.7°). Three days later the temperature rose to 40.7° , the pulse was hard and full, 84 beats a minute. On the fourth day the headache was almost unbearable, the patient groaned continually, tossed about in bed, and showed marked psychic depression after a few hours. All this time the left side of the head was sensitive to percussion, the mastoid process painful on pressure, the discharge from the ear purulent, of moderate quantity. The same day there was found unequal size of the pupils and slight reaction to light, constipation, nausea, sometimes vomiting, and great dizziness. The patient could neither stand nor sit; he felt as though he were to fall from the left side of the bed, or that it were turned to the left, and as though the head were lower than the feet. On the fifth day the following additional symptoms appeared: stiffness of the neck, contraction of the extremities, and complete unconsciousness, with coma. The treatment during these five days consisted in disinfection and application of the air-douche; upon the head, upon the left side of which sublimate salve was rubbed several times, there was always an ice-bag; leeches and a vesicant were applied to the mastoid process and Wilde's incision was performed; internally calomel with jalappa, afterwards *infus. sennæ compos.*, were given; but all these remedies failed to affect the course of the disease in the slightest. As in this case there could be no doubt of the diagnosis of meningitis, I considered it useless to open the mastoid process and thought the patient doomed. The chief-of-staff, however, urged me to do the operation, as there was nothing

to lose, and so I performed it the same day. The mastoid process proved sclerosed in its entire thickness; when therefore I had penetrated to a depth of almost 2 *cm* and had neither reached the antrum nor found a trace of pus, I desisted, filled the wound with iodoform-gauze, and applied the usual sublimate bandage. The operation was performed almost entirely without chloroform, the comatose patient being entirely indifferent to our proceedings. A few hours after the operation the temperature had fallen to 38.1°; pulse, 120. On the second day consciousness began to return and the intensity of the other symptoms to abate. On the eighth day he could sit up in bed for fifteen minutes, and on the seventeenth even walk about in the room. The wound healed in nine weeks. There was no fever whatever. The discharge from the ear, which had ceased for two days after the operation, returned and could not be checked. The perforation in the *membrana tympani* also remained unaltered.

The operation in this case must have acted merely by depleting the cerebral blood-vessels; upon the suppuration in the ear it had neither a direct effect, because we did not reach the source of the pus, nor an indirect one, as the subsequent continuous discharge from the ear proves. There can be no doubt however that it saved the patient's life.

Throughout Europe the mastoid process is opened with the hammer and chisel. I also operate principally in the same manner, and until lately only with the chisel, as this method is the least dangerous, the wound remains clean during the operation, and can easily be kept under observation. A few months ago the surgical department of the hospital received a trephine à crémaillère for operations on the bone. It is precisely the same trephine which Pasteur uses in his investigations on animals. I was advised to use the instrument for opening the mastoid process. I have done so twice, and once the operation was done by the consultant of the surgical department. No conclusions can be drawn from these three operations, and I shall therefore confine myself to giving the impressions which this method of operating made upon me: 1. The removal of the compact portion of the mastoid process, especially when it is thick, is much more rapid than with the mallet. 2. The

edges of the wound need not be smoothed off after the operation. 3. The different size of the trephines permits the formation of a wound in the bone of the desired size. 4. Shock, which can be avoided with the hammer only to a certain extent, is entirely obviated with the trephine. 5. The depth of the wound can be graduated with exactness. An inconvenience however lies in the fact that the wound can only be inspected when the trephined piece of bone has been lifted out, which in sclerosed bone may not be easy. For operating in the mastoid cells the sharp spoon is sufficient. The true value of this method of operation can only be arrived at from a large number of them, performed by various surgeons.¹ I believe that in opening the cranial cavity for the evacuation of cranial abscesses the trephine is even to be preferred to the broad chisel, as in removing a large piece of bone with the latter instrument we must operate long with it, so that the shock must be quite severe, which with the trephine is not the case, even when applied at several adjacent spots.

¹ Another series of openings of the mastoid process seems to argue more in favor of the hammer and chisel.

A CONTRIBUTION TO THE HISTOLOGY OF AURAL POLYPI.

By C. KLINGEL, OF HEIDELBERG.

Translated by CASEY A. WOOD, of Chicago.

I AM under deep obligations to my honored teacher, Professor Moos, for the encouragement and the opportunity he has so kindly given me to examine microscopically the following fifteen cases of aural polypi removed from patients attending the University Ear Clinic:

I.—FIBROMA MYXOMATODES.

F. B., æt. thirty-two. Left ear. Suffered for fifteen or sixteen years with earache, headache, occasional vomiting, otorrhœa, and difficulty of hearing. Seventeen years ago had a polypus removed. Patient now complains of tinnitus, vertigo, and vomiting, the latter coming on every three or four days.

The polypus was snared May 21, 1887. It projected from the tympanic cavity, although at first it presented the appearance of being attached to the handle of the malleus. Later treatment with the galvano-cautery revealed the fact that a portion of it lay within the middle ear. The treatment was first plumbic acetate (1:5), then the galvano-cautery, and finally absolute alcohol. Patient discharged cured Aug. 20, 1887. No relapse.

External appearance.—Club-like in shape; about 2 cm long and 1 cm broad: it has on one side, near its base, numerous small lobules.

Structure.—The tumor is principally composed of inucoid areolar tissue. Ramifying throughout this mass in every direction are extremely fine fibres which interlace and form a delicate network. The cells, some round, some spindle-shaped, some stellate,

are variously arranged. The blood-vessels are few in number, and in their immediate neighborhood the round cells are more thickly disposed, *i. e.*, granulation tissue. Portions of the periphery and each lobule contain recently formed connective tissue crowded with cells and vessels; granulation tissue. There are two kinds of epithelium; lying deep between the lobuli is a stratum of cylindrical epithelium, while the peripheral portions show a thin epidermoid layer. Here and there the rete Malpighii sends processes into the substance of the polypus.

II.—GRANULATION TUMOR.

J. M., æt. twenty-two, had for three years a bilateral *otitis media chronica*. On the right side a polypus springing from the wall of the labyrinth; with it occasional pains and difficulty of hearing. Left side, above and behind, a perforation through which the long process of the incus can be seen. The treatment consisted at first of insufflations (both sides) of boric acid; on the right, alcohol. June 11, 1887, the polypus was removed with the cold snare, followed by the alum tampon until June 14th. The right ear was then treated with alcohol and especially with the galvano-cautery until June 30th. The left ear was cured by the boric-acid treatment. No relapse.

External appearance.—Small tumor, about the shape of a three-sided pyramid, and 5 mm high.

Structure.—Numerous round cells in a delicate reticulum. Many vessels. Scattered patches of myxomatous tissue. Blood extravasations with pigmentary changes. No epithelium.

III.—FIBROMA MYXOMATODES.

L. Lt., æt. six, has suffered for four years with chronic middle-ear suppuration, with formation of polypi. Earache, otorrhœa, and difficulty of hearing. The history also shows that when four weeks old the patient had had an inflammation of the ear, following an attack of whooping-cough. An examination (June 7, 1887) reveals the presence of two polypi in the tympanic cavity attached to the labyrinth wall.

One polypus was (June 16th) removed by means of the cold snare. Cotton-wool tampon and alcohol absol. Patient used at home instillations of plumbic acetate 4:40.

The second tumor was extracted in the same way. Alum tampon and at home the same lead application. Dismissed July 28th, cured. No relapse.

External appearance.—Length about $1\frac{1}{2}$ cm; 1 cm wide. Club-shaped, with lobuli at the base.

Structure.—Chiefly myxomatous. Isolated blood-vessels. At the surface more richly formed connective tissue rich in round cells. In the lobules also granulation tissue and numerous vessels. Two kinds of epithelium. The interlobular portions as well as the inferior sections of the main tumor contain a layer of cylindrical epithelium. The free end of the tumor is clothed with epidermis. In addition to this there are various gland-like, epithelial processes covered with cylinder-epithelium.

IV.—GRANULATION TUMOR AND ANGIOFIBROMA.

J. R. has had for five weeks a purulent otitis media with formation of polypi. Also an affection of the mastoid process and post-nasal adenoid vegetations. Pains said to have set in four weeks before. Removal of a polypus and mastoid incision. Jan. 28, 1888, mastoid operation and extraction through the external meatus of a polypus by means of the cold snare. The polypus was attached to the border of a fistulous opening in the posterior wall of the bony meatus which communicated with the mastoid cells. Disinfectant injections were continued until Feb. 12th.

Recurrent polypi were treated with absolute alcohol and the galvano-cautery—unsuccessfully. On June 9th the pain had returned with copious suppuration. Facial paresis [probably due to caries or retention of pus (?)] also set in. Several granulations were on this date removed under general anæsthesia. This was followed by a permanent cure and by the disappearance of the paralysis.

External appearance.—Small tumors not larger than peas with tuberculated surfaces.

Structure.—In one preparation (a) recent, multicellular connective tissue. In its centre a hemorrhage. Isolated bands of areolar tissue with parallel fibres and rich in cells. Within the blood-clot vascular formations and cells partly arranged in rows.

In the second (b) preparation the neoplastic cellular tissue possesses an angio-fibromatous character. In both preparations epidermis can be seen sending processes (Zapfen) deep into the substance of the growth.

V.—FIBROMA MYXOMATODES.

A. B., æt. thirty-two, had a right-sided *otitis media purulenta* for several years. A polypus said to have been removed in 1871 at

Freiburg. On Feb. 21, 1888, found a large tumor attached to the wall of the labyrinth. Feb. 23d, polypus removed with cold snare. Alum tampon. Further treatment: absolute alcohol and repeated galvano-cauterizations until April 14th. Then absolute alcohol alternating with plumbic acetate (1:10) and galvano-cautery. Discharged June 2, 1888, with cicatrix covering the whole promontory.

External appearance.— $1\frac{1}{2}$ cm long and 1 cm wide. Club-like shape with smaller lobules.

Structure.—Myxomatous tissue. In the periphery and in the lobuli new-formed areolar tissue. Vessels are few but rather more numerous in the periphery. On one side is a dilated blood-vessel. A single layer of cylindrical epithelium covers the largest part of the tumor—the minute tubercles. Epidermis on the portion exposed to the external air.

At the periphery there are several cavities invested partly with cylindrical and in part with flattened epithelium. In the same locality are gland-like depressions to be seen. The cavities contain a finely granular, structureless mass with here and there a desquamated epithelial cell. There are no glandular elements.

VI.—FIBROMA MYXOMATODES.

L. G., æt. forty-four. *Otitis med. purulenta chronica* for three years, with double-polypus growths attached to the labyrinth wall on the left side. Severe pains.

One polypus removed by the cold snare, May 1, 1888, after which a quantity of partially inspissated pus escaped. Alum tampon. On May 5th a left facial paresis appeared. After syringing, another tumor was seen, which was treated with absolute alcohol until June 23d. Complete cure, including the facial paralysis, without relapse. Central perforation remained.

External appearance.—Length, 2 cm; breadth, 1 cm. Smooth surface; no tuberosities.

Structure.—Myxomatous tissue extremely rich in cells, vascular throughout, and permeated by recently formed areolar tissue. Many spots are of a decidedly angio-fibromatous character. Only one comparatively small area is covered with epidermis which sends out slender offshoots into the substance of the tumor. With this exception, the epithelium appears to have been accidentally stripped from the specimen.

VII.—FIBROMA MYXOMATODES.

J. B., æt. nine, had a right-sided deafness for a long time, and several years ago pains and otorrhœa. Then an intermission. For fourteen days past a renewal of the pain and discharge. An examination (Nov. 9, 1888) discovers a polypus that completely fills the lower end of the meatus. Only an upper segment of the drumhead is visible. A probe can be passed above, behind, and below the polypus, which springs from the labyrinthine wall. Posterior half of membrana tympani wanting. Operation with cold snare, Nov. 10th, was followed by an attack of syncope. In the night (Nov. 11th–12th) headache, feverishness, restlessness, vomiting. Temperature 39.2° . Evening temperature, Nov. 12th, 40.2° ; pains on back of head and general malaise. Pupils normal. Nausea Nov. 16th. Temp. normal and much purulent discharge. Vertigo on 27th November. Further treatment consisted of boracic acid until patient was discharged on Feb. 28th. Ear dry and perforation closed. No relapse.

External appearance.—About 1 cm long, $\frac{1}{2}$ cm wide. Numerous obules.

Structure.—Central portion myxomatous; at the periphery and in the lobules recent connective tissue. Not many blood-vessels; some of them are dilated. Sometimes the layer of cylindrical epithelium is plainly separable from the underlying tissue, sometimes it is not.

VIII.—FIBROMA MYXOMATODES.

S. K., æt. ten, had from early infancy otorrhœa and difficulty of hearing. Examined Jan. 10, 1889, when a large growth was observed projecting into the external meatus. On Jan. 14th a piece of the tumor is said to have become detached spontaneously.

On Jan. 15th patient was anæsthetized and a large polypus, protruding from the tympanic cavity, was removed with the cold snare. Alum tampon. Absolute alcohol was also prescribed for a second tumor, whose point of attachment it was impossible to ascertain since the sound could not be used owing to the restlessness of the patient. The polypus operated upon had its origin in the region of the stapes. After removal patient left the clinic.

External appearance.—Length $1-1\frac{1}{2}$ cm, and consisting of several lobules.

Structure.—Central portion myxomatous areolar tissue ; also isolated connective-tissue bands composed of parallel fibres. In the peripheral portions connective tissue of recent growth and crowded with cells. Numerous vessels.

Very thick epidermis which sends thick, branching processes into the substance of the tumor. In one situation such an offshoot has split at its centre into two portions.

IX.—FIBROMA MYXOMATODES.

E. W., æt. eleven. Right-sided *med. pur. chron.* With mastoid affection and formation of polypi. Adenoid growths in post-nasal space. The affection said to have lasted a year, with otorrhœa and difficulty of hearing. Had, a year ago, gastric fever of ten weeks' duration. For the past four or five weeks swelling of the right mastoid process. An incision made three weeks ago gave exit to very little pus.

The removal (February 23, 1889) of the polypus, which sprang from the posterior wall of the bony meatus, was followed by operation on the mastoid. The stump of the polypus was burned with the electro-cautery and boric acid insufflated. The purulent discharge from the mastoid continued until the 11th of March, when the adenoid vegetations were removed and the remains of the polypi were again treated by the electro-cautery. As a result of this additional portions came away. Discharged April 9th.

External appearance.—Lobulated tumor 2 cm long and 1 cm wide.

Structure.—Internally multicellular myxomatous tissue surrounded by recent areolar tissue. Few vessels in the former, more in the latter.

The tumor is partially covered by thin epidermis, and in the offshoots before referred to there is some cylindrical epithelium.

X.—ANGIO-FIBROMA.

G. L., æt. twenty-eight, a phthisical subject, had on the left side a purulent middle-ear inflammation, central perforation, and for nine months suffered from occasional pains, otorrhœa, and difficulty of hearing. Four or five weeks ago a circumscribed otitis externa set in.

Polypus operated on March 21, 1889. The tumor was attached to the posterior wall of the bony meatus. Alum tampon. March 23d, a second piece removed, and still another March 28th. The

rest of the treatment consisted of the galvano-cautery and instillations of absolute alcohol. Subsequently the patient did not return.

Only one specimen was examined.

External appearance.—Flattened tumor (composed of two lobes) about 1 cm long, 1 cm wide, and 5 mm thick.

Structure.—Angio-fibromatous tissue. In some situations vascular new growths, *i. e.*, cell cords (*Zellstränge*), between two vessels.

The tumor is clothed with epidermis, which sends into the substance of the polypus broad processes with manifold ramifications that often have bulbous terminals.

XI.—FIBROMA MYXOMATODES.

K. S., æt. thirty-four. For seven to eight weeks nasal catarrh and tinnitus aurium. On the right side for five weeks pain, otorrhœa, and deafness.

April 4, 1889, warm water ordered for hardened secretion, which consists of inspissated pus and cholesteatomatous masses. April 11th, a polypus, which sprang from the posterior-superior wall of the bony meatus, was removed with the snare. Alum tampon; afterwards galvano-cautery. Discharged (May 28th) cured, and no relapse.

External appearance.—A small lobule with a narrow pedicle and about the size of a pea.

Structure.—The growth consists of mucous tissue; the pedicle in part of new connective tissue rich in cells, in part of fibrous tissue. A good many engorged capillaries, which are partially dilated.

Epidermal covering of varying thickness. In isolated depressions cylinder epithelium.

XII.—FIBROMA MYXOMATODES.

F. S., æt. eleven. Left side, otorrhœa and difficulty of hearing for two years. July 30, 1889, removal by snare of a large polypus attached to the labyrinthine wall. Alum tampon. Later, absolute alcohol and galvano-cautery. Discharged, January 18, 1890, cured. No relapse.

External appearance.—2 to 2½ cm long, narrow pedicle and bulbous end. Also a thin tapering excrescence.

Structure.—The pedicle is partly formed of myxomatous tissue, in portions of whose lobules is new-formed areolar tissue full of

cells. At the junction of the pedicle with the larger tubercles are parallel, undulating connective-tissue fibres with spindle-shaped cells. These, as well as mucous tissue, are also found in the tubercles themselves.

Epidermis covers the larger lobules, and in detached depressions are single layers of cylindrical epithelium. The pedicle, with its lobules and depressions, is also covered with cylinder epithelium.

XIII.—GRANULATION TUMOR.

M. E., æt. thirty-nine. Eight weeks ago severe pain on right side lasting eight or ten days. Swelling in external meatus, and otorrhœa. On January 30, 1890, removal of a polyp (attached to the wall of the labyrinth) by means of the cold snare. Alum tampon. Further treatment, galvano-cautery and alum. Discharged, February 8th, as cured.

External appearance.—Semicircular piece 7 mm long, 2 to 3 mm wide.

Structure.—Entirely composed of granulation tissue with numerous blood-vessels. Some of these are obstructed through growth of the adventitia. No epithelium present.

XIV.—ANGIO-FIBROMA MYXOMATODES.

N. B., æt. forty-seven laborer. Since childhood, left-sided otorrhœa. For six months has had a tumor in left ear. A polypus with attachment to the wall of the labyrinth removed by cold snare. Subsequent syringing dislodged masses of cholesteatoma. Repeated applications (until February 25th) of galvano-cautery to the stump. Polypus has completely disappeared but patient is still under treatment for the discharge.

External appearance.—Length 3 cm. A number of long, narrow, pedunculated lobules.

Structure.—Chiefly newly-formed areolar tissue often presenting an angiomatic character, intermingled with myxomatous portions. Numerous dilated vessels.

The tumor is invested by a single layer of cylindrical epithelium. On the parts exposed to the external air the epithelium has a greater resemblance to the epidermis.

XV.—GRANULATION TUMOR.

M. B., æt. fifty-six. Right side, occasional pain for two years, and otorrhœa. The disease began with tinnitus, and then the

discharge set in. On February 3, 1890, a fairly large tumor was noticed projecting into the external meatus. As was proved on removal (February 4th), it was attached to the middle of the labyrinth wall. Alum tampon. February 5th pedicle touched with electro-cautery. Further treated with alcohol and galvano-cautery. Discharged cured February 24th.

Only a small portion available for examination.

Structure.—Granulation tissue. Here and there myxomatous as well as angiomatous portions. No epithelium.

REMARKS.

A purulent otitis was the cause of the polypi in all of the foregoing fifteen cases, just as the majority of polypi are developed in the case of chronic (more rarely acute) middle-ear suppuration and primary inflammation of the external auditory meatus.

Of 100 polypi described by Moos and Steinbrügge,¹ 68 were the result of purulent inflammation of the middle ear, and 25 of the meatus externus. Weydener² has described 73 aural polypi. Of these 69 depended upon *otitis media purulenta*, while 4 were associated with affections of the external meatus. In only one of the specimens examined by me—a child—was pertussis set down as a cause. In the histories of the remaining cases little or nothing is said about the co-existence of other infectious diseases. There can be no doubt but that a more thorough inquiry would have revealed the presence of a larger number of these. Moos and Steinbrügge, for example, thought sixteen of their cases to be due to infection, and believed that number to be too small.

Regarding the *structure* of the specimens there are principally three kinds of tissue to consider, viz., myxo-fibromatous, angio-fibromatous, and granulation tissue. When, in describing these polypi, I have referred to one or other of them as a myxo-fibroma, angio-fibroma, etc., it must not be concluded that in a particular specimen only this or that formation had been found. On the contrary, all these new growths quite frequently existed side by side in the same

¹ THESE ARCHIVES, vol. xi., p. 328.

² THESE ARCHIVES, vol. xiv., p. 49,

tumor, and the neoplasm took its name from the tissue or tissues that were best represented in it. I have chosen the names myxo-fibroma and myxo-fibromatous tissue because that structure, a sort of connective tissue, bears a close resemblance to mucous tissue.

Steudener¹ distinguishes three principal types: (a) the ordinary mucous polypus, (b) the more compact connective-tissue growths (fibroma), and (c) myxoma. Moos and Steinbrügge observed four different kinds: granulation tumors, angio-fibroma,² fibroma, and myxoma. Kiesselbach adds another class, "mucous polypi"—fibroma with an areolar structure and interstitial material containing mucin.³

It is characteristic of *myxo-fibromatous* tissue that the intercellular substance of its areolar tissue is composed of delicate reticulated filaments. In this interstitial material lie cells of various shapes and complex ramifications—round, oblong, spindle-shaped, stellate. The cells are not found in compact masses, but in smaller or larger interstices. It is practically the same tissue that Kessel⁴ has so fully described, and which he found in almost all the polypi examined by him. Kessel regards this tissue—whose structural peculiarities are more strongly marked than almost any other connective-tissue formation—as saturated by serous fluid and œdematous, in much the same way as are the majority of the nasal mucous polypi described, later on, by Hopmann. Steudener has also examined this tissue, and found that the interstitial substance, which in the fresh state appears to be entirely homogeneous, becomes finely granular on the addition of acetic acid. In Steudener's cases it also contained mucin.

In polypi containing this tissue the cells noticeably increase in number towards the periphery, and in that situation pure granulation tissue is met with.

There is nothing remarkable about the *granulation tissue*; it exhibits the usual structural peculiarities.

The *angio-fibromatous* tissue resembles granulation tissue

¹ *Arch. f. Ohrenheilk.*, Bd. iv., 1869.

² *Monatschr. f. Ohrenheilk.*, 1887, No. 4.

³ There still remain the rare cases—pure vascular growths (angiomata)—described by Buck and Moos as arising from the handle of the malleus.

⁴ *Arch. f. Ohrenheilk.*, Bd. iv., 1869.

in containing masses of round cells, but, unlike the latter, they are not regularly arranged within an interstitial reticulum, but are more closely connected with the masses of newly formed vessels. This recent areolar tissue, as it may properly be called, originates from the walls of the vessels themselves, since there is an increased growth not only of the elements of the adventitia, but of the intima as well. In consequence of such an hypertrophy of the cells of the intima, the lumen of the blood-vessels may be so completely obliterated that the latter becomes a mere cord of connective tissue studded with cells. The tissue resulting from the increase in the adventitious elements, consists of cells which arrange themselves concentrically about the vessel.

Both in granulation tissue as well as in angio-fibromata, one finds rows of cells that stretch from one vessel to another. These are to be regarded as new vessels in the first stage of development.

This angio-fibrous tissue is also described by Moos and Steinbrügge, as considered by well-known observers to be a chronic alteration leading to the obliteration of the blood-vessels, and in consequence to the formation of all anæmic and compact fibrous tissue.

Isolated bands of true connective tissue containing a few spindle-shaped cells and intercellular material, with parallel fibres, were found in the specimens. This was best seen about the pedicles and in isolated patches. Meissner also mentions it.

Kessel has also described a formation which exhibited connective tissue in one small locality only, and was with this exception composed of blood corpuscles and vessels. From the areolar tissue broad bands stretched into the body of the growth. This formation Kessel regarded as an organized blood-clot and compared it with the so-called "fibrinous blood polypus" of the uterus. I have noticed something like this in various specimens, especially in Case 4, (a), where on one side of the tumor is a large blood extravasation. In it there are bands composed of cells with interstitial fibrous material and evidence of vascular formations. It is not possible to decide whether this condition results from the

organization of a blood-clot or from the tissue having been merely disintegrated by the extravasated blood-clot.

The *epithelium* of the polypi in view of its interesting character, **demand**s our attention. In short, the examined specimens present (1) **well-formed** epidermis, (2) true cylindrical (ciliated) epithelium, (3) **intermediate forms**, *i. e.*, gradations from single layers of cylindrical epithelium to stratified pavement epithelium; the former first becomes stratified and then the upper cells assume at one time a polygonal at another a flattened form.

The cylindrical epithelium is, as a rule, disposed in a single layer and is best seen in the grooves between the minute lobules of the polypus. Here can be seen parallel and adjacent cylindrical cells with large, readily stained nuclei. The nucleus, in which distinct nucleoli are often to be seen, always lies more on the basal portion of the cell, where, too, the cellular protoplasm is nearly always more deeply stained. Unfortunately I cannot make out in my preparations the presence of the cilia seen by other observers in aural polypi. It is certain that they can be seen only in recent specimens. Yet I believe that I have observed traces of them in several situations.

The border line which separates the single layer of columnar epithelium from the underlying areolar tissue is, as a rule, sharply defined. There are, however, exceptions to this, as when certain cells have a tapering point directed downwards or often project long processes into the vascular, multicellular connective tissue lying immediately beneath them. Unlike Kessel I have not observed a direct connection between these epithelial processes and the walls of the vessels.

The *epidermis* was found to be of varying thickness in the different tumors. It sends projections into the tissues beneath, which are sometimes delicate, but are occasionally of large size and extend quite through the whole growth. According to Moos and Steinbrügge, such an epithelial band traversing the tumor may divide at the middle and be the cause of separating the growth into two parts.

In very many specimens, both forms of epithelium (with

gradations between them) lie side by side. The columnar epithelium is found in the deeper portions between the lobules, whence there is an easy transition to the outer portions exposed to the external air.

On the surface also are delicate, gland-like depressions covered with cylindrical epithelium, where epidermis is commonly found. According to Kessel the columnar epithelium in this locality owes its presence to the fact that the original rete Malpighii had been removed by the œdema of the parts, and only the lowest layers remained and took on the columnar form. This view is supported by Weydener, while Kiesselbach announces the theory that in these cases the proliferating cylindrical epithelium of the tympanic cavity has been changed into epidermis through the influence of the external air. I entirely agree with this opinion of Kiesselbach. In all human neoplasms where epithelium is found the latter has, to begin with, the character of the parent tissue until it is altered by the force of external influences. In polypi which have their origin in the external meatus one finds the pavement epithelium proper to that situation. In the tympanic cavity both kinds of epithelium are present; in the inferior portions near the opening of the Eustachian tube ciliated epithelium, in the upper segment pavement epithelium. It is, therefore, possible that a polypus arising from the cavity of the tympanum may possess either pavement or columnar epithelium, according to the particular locality from which it springs. Epithelium of the cylindrical cavity may subsequently be transformed by exposure to the outside air into (epidermis) pavement epithelium. Finally, there is also the possibility of the mucous lining of the tympanic cavity assuming the characteristics of epidermis in consequence of long-continued inflammation; for the same reason when polypi undergo a transformation they may also become invested with an epidermic covering.

Kiesselbach has observed both varieties of epithelium in polypi attached to the inner termination of the meatus externus. These were not separated at their borders by the usual intermediate forms, but ran directly into one another. He did not conclude from this that one form had suddenly

changed into the other, but that the polypi themselves had had an origin from a locality where both varieties of epithelia existed side by side. In my opinion Cases ix. and xi. belong to this category.

I observed cavities clothed with epithelium in one instance only—in No. v. They were found in one side of the tumor, directly under the surface, in the neighborhood of minute fissures situated between diminutive lobular formations. These were regarded as retention cysts (Steudener) from obstructed glands. However, in none of the examined polypi were there true glands. It is true that these epithelial depressions frequently resemble glands, but they are either cavities between two lobules of the tumor or are the result of a splitting of the epithelial band itself. Others thought that the free ends of some of the lobules growing together, the fissure between them being shut in and the secretions continually being given off from the enclosed surfaces no longer escaping, the fissure became dilated into a cavity. I concur in this opinion so far as regards the case observed by me, because in the neighborhood of the cyst such a fissure could be seen, but not a single gland.

Blood-vessels are present in the myxomatous tissue to a comparatively slight extent. They have invariably the character of capillaries, and their adventitia and intima can be plainly made out. These are separated by a space more or less broad—the perivascular lymph-space of His.

Sometimes evidences of proliferation are present in the cells of both the intima and adventitia, which indicate the formative massing of round cells. These recently formed cellular bodies are often arranged in rows as if they were the forerunners of new blood-vessels.

Regarding the relations of the vessels in the angio-fibromatous tumors, consult the foregoing. Not infrequently these were dilated, especially in the neighborhood of the pedicle of the growth.

The *growth* of aural polypi appears to take place in the separate lobules and particularly at the surface. The basal tissue is usually denser, poor in cells, and appears to cease to develop. Growth takes place chiefly in the recent, many-

celled areolar tissue—in the granulation tissue,—which in our cases was found in the periphery of the tumors. The neighborhood of the vessels in the interior of the growth consists of granulation tissue, and it is by no means disproved that these are not the beginnings of vascular and other new formations.

According to Weydener almost all polypi are originally granulation-tissue tumors whose final stage is a complete change into connective tissue. In acute or chronic purulent middle-ear inflammation, along with ulcerative processes, there goes hypertrophy of the mucous lining of the tympanic cavity. Granulations now form and continue to increase in size and number until they develop into areolar or mucous tissue.

Finally, in regard to *retrograde changes* I have seen, in addition to some hemorrhages and pigment formations, small vitreous spots, which gave me the impression of amyloid degeneration. Meissner mentions cystic degeneration, fatty metamorphosis, and molecular disintegration, corpora amylacea, and the formation of colloid substance in the cysts. Moos and Steinbrügge especially mention, as histological conditions, (1) blood extravasations and their pigmentary changes; (2) bony new-formations; (3) central necrosis, and (4) cyst formations. In addition to these he reports central cholesteatoma formations. I myself observed in only one case—No. xiv.—that immediately after syringing out the ear a whitish mass, shining like mother-of-pearl, was extruded.

A microscopical examination showed an epithelial structure with indications of nuclei.

Kiesselbach mentions cases that closely resemble the one with central cholesteatoma described by Moos and Steinbrügge, and might easily be mistaken for it. These referred to sections which had so struck the columnar epithelium that only their terminations without nuclei were visible.

REPORT ON THE PROGRESS OF OTOLOGY DURING THE FIRST HALF OF THE YEAR 1890.

BY PROF. AD. BARTH, MARBURG.

Translated by Dr. MAX TOEPLITZ, New York.

NORMAL AND PATHOLOGICAL, ANATOMY, HISTOLOGY, AND PHYSIOLOGY OF THE EAR AND NASO-PHARYNX.

I.—ANATOMY.

a.—HEARING ORGAN.

1. ROHRER, F., Zurich. The bacteria of cerumen. Lecture delivered at the International Congress of Otologists and Laryngologists at Paris, September, 1889. *Arch. f. Ohrenheilk.*, vol. xxix., p. 44.

2. SCHWALBE, Prof. G. Strassburg. The projection of the external auditory meatus in birds. With one plate. *Arch. f. Anat. u. Physiol.* (Anat. part), 1890, p. 42.

3. SUTTON, J. B. Supernumerary auricles. *Illustr. Med. News*, London 1889, vol. iv., p. 52.

4. RANKE, Prof. H. Case of malformation of the ear. *Sitzungsber. d. Ges. f. Morphol. u. Physiol. in Munich*, No. 2, 1889, p. 68.

5. BACON, W. G. Malformation of auricle caused by imperfect development; imperforate meatus; maternal impression. *New Zealand Med. Four.*, Dunedin, 1888-9, vol. ii., p. 241.

5a. EVE and BIDWELL. Supernumerary auricle in the neck. *The Lancet*, Nov. 16, 1890.

6. KOSTANECKI, K. VON and MIELECKI, A. VON. The congenital branchial fistulæ of man; their anatomical importance and

relation to allied branchiogenous malformations. III. (From the I. Anat. Instit. at Berlin.) *Virchow's Arch.*, vol. cxxi., pp. 55 and 247.

7. RUMLER, Assistant to the aural policlinic of the University of Bonn. Contribution to the knowledge of regeneration and cicatrization of the membrana tympani. With one plate. *Arch. f. Ohrenheilk.*, vol. xxx., p. 142.

8. KILLIAN, G., Private lecturer. The aural muscles of the crocodile, together with preliminary remarks upon the homology of the stapedial muscle and the stapes. (From the Anatom. Instit. at Freiburg-i.-Br.) With one plate. *Fenaische Zeitschr. f. Naturwissenschaft.*, vol. xxiv., neue Folge xvii., p. 632.

9. BUCK, A. H. A revised description of the anatomy of the elephant's ear. *Trans. Amer. Otolog. Soc.*, 1890.

10. RICHARDS, HUNTINGTON. A further report on the anatomy of the elephant's ear. *Trans. Amer. Otolog. Soc.*, 1890.

11. GRADENIGO, I. Clinical and bacteriological contribution to the knowledge of the affections of the ear in influenza. (Les affections de l'organe de l'ouïe dans l'influenza. Contribution clinique et bactériologique. *Turin. Ann. des mal. de l'oreille*, etc., 1890, p. 382.

12. KIRCHNER, W. Würzburg. Extravasation into the nervous sheath of the chorda tympani in diphtheria of the tympanic cavity. (From the aural clinic of the university.) *Centralbl. d. Allgem. Pathol. u. Patholog. Anat.*, 1890, vol. i., p. 1.

13. HABERMANN, I. Additional contribution to the knowledge of the development of cholesteatoma in the middle ear. (From Professor Chiari's pathol. anat. institute at the German university at Prague.) *Zeitschr. f. Heilk.*, vol. xi., p. 89.

14. RANDALL, B. A. Cholesteatoma of the ear. *Four. Amer. Med. Asso.*, 6th September, 1890.

15. POLITZER, Prof. A. Histological investigations upon the pathological changes in the niches of the oval and round windows which take place in the affections of the mucous membrane of the tympanum. (Recherches histologiques sur les changements pathologiques dans les niches et de la fenêtre ovale et de la fenêtre ronde qui se produisent dans les affections de la muqueuse de la caisse du tympan.) With three plates. Brussels, 1889. (Lecture delivered at the International Congress, 1888.)

16. MYGIND, HOLGER, Copenhagen. Review of the pathologicoanatomical changes in the ear of deaf-mutes, based upon a number of post-mortem examinations. *Arch. f. Ohrenheilk.*, vol. xxx., p. 76.

17. KRAUSE, RUDOLPH. Embryology of the membranous semicircular canals. With one plate and six zincotypes. (From the II. Anat. Instit. at Berlin.) *Arch. f. Microsc. Anat.*, 1890, vol. xxxv., p. 287.

18. GRADENIGO, Turin. Contribution to the knowledge of neuritis acustica caused by meningitis. (Contribuzione alla conseguenza della nevrite dell' acustico da meningite.) *Arch. Internat. de Laryng*, etc., 1890.

19. FLECHSIG, Prof. P., Leipsic. Further communications upon the relation of the lower corpus quadrigeminum to the auditory nerve. *Neurol. Centralbl.*, 1890, p. 98.

20. GOWERS, W. R., London. The function of the cerebellum. *Ibidem*, 1890, No. 7.

21. FERRIER, DAVID. On cerebral localization. The Croonian lectures at the Royal College of Physicians. *Lancet*, June, 1890.

1. ROHRER found in the cultures made from fifty cases of ceruminous plugs different bacilli, cocci, diplococci, and staphylococci. When injected into animals, in a great number of cases, changes were found in the liver, lungs, retroperitoneal, and mesenteric glands, but no tuberculosis. The author came to the conclusion that a large number of bacteria exist in the cerumen and may develop from it in proper nutrient soil; furthermore that besides a majority of saprophytic species, several forms of which were suspected of being pathogenic, were repeatedly found, and finally that schizomycetes may survive in the cerumen.

2. The investigations were made in order to explain by anatomical facts the temporary deafness of the mountain cock during the breeding time. It is improbable that it is produced by an occlusion of the auditory meatus by means of an osseous projection of the opened lower maxilla. On the contrary, it should be supposed that, as in other birds, the so-called "swelling-fold" upon the posterior wall of the external auditory meatus communicates with the pneumatic cavities situated farther backward and swells so much by inflation as to occlude the meatus. Besides SCHWALBE found in the "auditory tubercle" tubular, genuinely epithelial glands and another more sac-like form, which in their structure resemble more the sudoriferous glands.

4. The author first demonstrates a specimen in which the auricle was situated too far toward the mouth, and the meatus ended in a blind tube. Contrary to the view held during life, the tympanic cavity was entirely absent. The tube was rudimentary, and also ended blind. A child at seven was then presented. The auricles were rudimentary, the meatuses were absent. Despite fair hearing and speech, the desired operation revealed the fact that also here on both sides the parts developing from the first branchial fissure were not present, or at least in a faulty condition, while the function of the labyrinth was not impaired.

5a. EVE and BIDWELL describe and figure a very interesting case of a curious deformity. The supernumerary auricle was in the form of a nipple-like projection half an inch long, situated over the middle of the anterior border of the left sterno-mastoid. The projection itself contained a rod of cartilage prolonged from a thin plate, the size and shape of an ear, situated in the tissues below; on dissection this plate was found to consist of osseous material in the form of a bar (antihelix) and plate (lobule).

6. The authors describe the following structures: the branchial structures, cysts of secondary formation, genuine tumors, and complete teratomata. They were followed by congenital cutaneous growths in the aural region and upon the neck. They were considered as a heterotypical reproduction of the parts from which the auricle develops. The fistula auris congenita bears no relation to the primary aural fissure, since it is situated in front of the crus heliciis, which is never reached by the fossa auricularis. In accordance with His, a sulcus in this place can arise only by insufficient connection of the sulcus between the crus heliciis and crus supratragicum.

7. RUMLER experimented upon rabbits with the following result: (a) The outer epithelium, which exhibits an increase of cells after the first six hours, first takes part in the healing process of the defect, and for the most part during the first three days. (b) The epithelium of the mucous membrane participates after two days, and then plays an unimportant part. (c) From the third day the proliferation of connective tissue comes to the fore and leads to definite occlusion. The membrana propria, if concerned at all, takes but a slight part. The experiments were made in the Pathological Institute at Bonn.

8. After reviewing the literature, KILLIAN gives his own observations. He has examined the *Crocodilus niloticus*, biporca-

tus, acutus, an alligator from the Mississippi, and lizards and frogs for comparison. In crocodiles he found a muscular elevator and depressor auriculæ, which open and close the aural flap. A third muscle is found in the middle ear, which consists of three portions, and is attached to the postero-superior quadrant of the membrana tympani. Its contraction should stretch the drum membrane and at the same time erect the oblique columella, which increases the tension.

9. BUCK, having discovered that in the description he gave of the anatomy of the elephant's ear in the *Transact.* of 1888, the plane of the section was vertical instead of horizontal, has in this paper revised that description in the light of this discovery. It is illustrated freely, but is too long and elaborate for a mere abstract to do it justice. .

SWAN M. BURNETT.

10. This paper of RICHARDS, like that of Buck, cannot be intelligently reported in a short abstract. It is a study of the same specimen as forms the foundation of Buck's paper.

SWAN M. BURNETT.

11. GRADENIGO publishes six well observed cases of influenza of the ear. He examined the secretions of the ear bacteriologically, and found the diplococcus as well as the micrococcus and the staphylococcus and the staphylococcus pyogenes. The course of the otitis in influenza may be severe in one case, as in other inflammations of the middle ear, and slight in the other.

12. KIRCHNER found the middle ear of a child, who died of laryngeal diphtheria, in the initial stage of diphtheria. Besides a slightly fibrinous deposit upon the mucous membrane of the middle ear, which was imbued with cocci, there was found a dense infiltration of small cells in the nerve sheath of the chorda tympani, so as to compress well nigh half of its transverse section. Cocci and fibrinous masses had not entered the nerve.

13. The first of the two cases has been described at the meeting of German naturalists at Heidelberg. The second case exhibited cholesteatoma in a patient suffering from purulent meningitis, originating from the ear, in which a direct connection with the integument could not be proved, but was assumed as quite probable. The author arrives finally at the following conclusion: if it should be concluded from the examination of cholesteatoma of the first two cases with positiveness, from that of the latter with probability, that the growing of the epidermis of the external auditory meatus or of the membrana tympani princi-

pally led in these cases to the formation of cholesteatoma, it can by no means be asserted that I should presuppose the same origin for all cases of cholesteatoma. I readily admit that cholesteatoma may originate as a real growth in the middle ear or by metaplasia of the epithelium of the tympanum, which facts have been proven by observations of other authors. I have added, based upon clinical experience, that the mode of development as I have described it occurs most frequently, an assertion which has been confirmed in the meantime by Bezold, Moos, and Politzer.

14. RANDALL relates the histories of several cases in which tumors more or less cholesteatomatous were found in the middle ear and invading neighboring parts. While not doubting that some such tumors may be primary, he still regards them as mostly secondary to inflammatory processes. ·SWAN M. BURNETT.

15. POLITZER first describes the embryonic state of the middle ear, and points out that the threads and membranes remaining from the retrogressive changes do not generally interfere with the hearing faculty; that they may readily cause, however, cicatricial adhesion in case of catarrh or inflammation. The cicatricial adhesions of the stapes are most frequently found at the lower crus, because it is much nearer to the tympanic wall than the upper. Between the bands and membranes near the oval window there are found in catarrh adhesive masses of mucus, deposits of small cells, and hemorrhages. In "dry catarrh," or membranous ankylosis (*ankylosis spuria*), and in some cases a genuine osseous ankylosis is not infrequently observed. The appearances of suppuration of the middle ear are as follows: swelling of the mucous membrane, new formations of cicatricial tissue, cysts, cholesteatoma, together with loss of ossicles or their partial destruction. At the round window the niche is found to have a different direction and width. The membrane is, in some cases, transparent, in others dull, or it is covered with a complete or perforated mucous layer. In rare cases bone replaces the membrane for the greater part. In chronic suppurations the niche is frequently filled with hyperplastic tissue or granulations, which were found by Politzer in one case to contain fat tissue. In an adult deaf-mute a hardly perceptible deepening was found in the bone in place of the round window. The lecture was illustrated by demonstrations of a large number of macroscopical and microscopical specimens.

16. HOLGER MYGIND gives a synopsis of the records of the

autopsies of deaf-mutes, and thus reviews 119 undoubted cases from the literature of the subject. He concludes therefrom that the result of various, principally former, autopsies was negative. In some cases the cause of deaf-mutism should be looked for exclusively in the middle ear. In two thirds of the cases pathological changes were found in the labyrinth. Vestibule and cochlea exhibit an almost equal frequency of disease. There is a striking frequency of affection of the semicircular canals. It is difficult to distinguish congenital changes from acquired ones. Undoubted evidences of arrested development are rarely found in the labyrinth, but most frequently in the cochlea. Atrophy and degeneration of the auditory nerves are exceptions.

17. The membranous semicircular canals develop from the primary labyrinth vesicle by a pouch-like bulging of its walls; the epithelium being brought into the centre where it is blended and absorbed. The two vertical semicircular canals arise from a common pouch in such a manner as to bring the epithelia in two places together, where they are absorbed, while the intermediate portion remains open and forms the common crus of both vertical semicircular canals. The horizontal semicircular canal originates in a separate pouch, which protrudes from the labyrinthian wall opposite to the entrance of the ductus endolymphaticus. The upper vertical semicircular canal develops first, then follows the lower vertical, and finally the horizontal canal separates. The ampullæ develop simultaneously with the semicircular canals.

18. GRADENIGO discusses briefly the relation between meningitis and meningitis cerebro-spinalis, and affections of the inner ear, as also inversely that between suppuration of the middle ear and meningitis, with reference to observations of his own and others.

19. In the new-born cat, the fibres belonging to the tuberculum acusticum and to the anterior auditory nucleus develop successively. At least four systems of fibres, two ventral and two dorsal ones, arise from the primary centres of the cochlear nerve. Three of these participate in the formation of the trapezoid body, one dorsal crosses partially behind the latter in the raphé, and then attaches itself to the trapezoid body near the upper olives. The lower brachium of the corpora quadrigemina has a double connection with the cochlear nerve, viz., from the tuberculum acusticum and from the anterior nucleus of the acoustic. In man only, the tract from the anterior auditory

nucleus to the trapezoid body is plainly visible. The vestibular nerve is principally connected with gray masses, which have relations with the cerebellum. The cochlear and vestibular nerves, therefore, are entirely different as regards their central connections.

"Baginsky, according to FLECHSIG'S investigations is not justified in denying the crossing of the *striae acust.* in the *raphé*, as is stated by Monakow, and his entire description proves that he has not recognized, with entire correctness, the central tract of the acoustic in the cat."

20. The middle lobe of the cerebellum governs the co-ordination of movement. This is possible, provided it exerts its influence upon the motor cortex of the cerebellar hemisphere. Its effect cannot be directed downward, for the two tracts of the spinal cord, the tract between the cerebellum and the spinal lateral column and also the posterior column, which are connected with the cerebellum, lead upward. There exists no proof of the fact that any fibre of the cerebellum descends to the spinal cord. The two above-mentioned tracts probably consist only of the ascending nerves of the muscles.

The impulses which govern these nerves are usually not perceptible, but it may be proven, *per exclusionem*, that our conception of position depends upon them. Strong impulses act upon our consciousness, thereby proving that the nerves are irritated. During a muscular convulsion, the pressure upon the nerve terminations, which are situated in the tissue connecting the muscular fibres, produces a painful sensation, and, after the convulsion, the muscular extension is expressed by pain. This lateral pressure and the longitudinal stretching are the means by which the nerves are irritated. This is the mechanism by which the passive state of the muscles exerts an influence upon the cerebellar cells. "*The cerebellum is reached also by the fibres of the acoustic, and probably also by those of the semicircular canals.*" The cells are probably also influenced by the action of the motor nerves belonging to the eyeball. These impressions are alike, inasmuch as they do not produce any sensation, and still their effect aids in the perception of the position of the body and its relation to the outside world. The condition of the nervous cells, which is thus produced, can influence the movement only in such a manner as to act upon the motor cortex, where the movements are co-ordinated.

This influence is conducted, through well-known paths, directly or indirectly, from the gray substance of the thalamus opticus or of the corpus striatum.

We understand, therefore, why the middle lobe, although of the same structure as the cerebellar hemispheres, has a different function.

The middle lobe is a regulating centre for those centripetal impulses which bear an especial relation to the motor phenomena, which are dependent upon the maintenance of the equilibrium and upon other movements, inasmuch as the latter are not produced by impression of the skin, but by the condition of the muscles.

About the further application of the theses mentioned, *e. g.*, concerning the knee phenomenon, compare the original.

Moos.

21. Aurists will be interested principally in that part of Lecture iv. which refers to the location of the hearing centre. Dr. FERRIER insists upon his original supposition that in the higher animals and in man the main seat of the hearing perceptions is in the upper parietal convolutions. Those who were present at the International Medical Congress at London, in 1881, will remember the experimental demonstration of this fact by Dr. Ferrier. The monkey, which was demonstrated at that time, remained deaf up to its death, which occurred ten months after the operation. Schaefer's experiments, of course, were opposed to this theory, but on account of experiments which were subsequently made, Dr. Ferrier does not feel disposed to change his opinion, which was later on confirmed by clinical observation. With reference to the experiments of Baginsky, Dr. Ferrier believes that the auditory nerve is probably connected with the centre, through the lower brachium of the other side, by means of the tuberculum posterius of the corpus quadrigeminum and of the corpus geniculatum internum et externum, and with the medullary fibres of the cerebral cortex. He is also in accordance with the views of Luciani and Tamburini, that a decussation of the fibres of the auditory nerves takes place similarly to that of the optic nerves, so that both ears are represented in each cerebral hemisphere; furthermore, he comes to the conclusion that only the vestibular fibres, which arise from the membranous semicircular canals, take their course through the cerebellum.

URBAN PRITCHARD.

b.—NASO-PHARYNX.

1. HESS, KARL. A case of multiple dermato-myomata upon the nose. *Virchow's Archiv*, vol. cxx., p. 321.

2. SCHWENDT, of Bâle. The congenital occlusions of the posterior nares and their operative treatment. Lectureship thesis. With seven plates.

3. KAFEMANN, A., Koenigsberg. Anatomical and therapeutical relations of the fornix pharyngis. *Monatsschr. f. Ohrenheilk.*, 1890, pp. 72, 102.

1. The specimens were taken from a girl, nineteen years of age. They were found to consist of multiple dermato-myomata, of the size of a millet-seed to a linseed.

2. We limit our remarks upon this very elaborate and well-gotten-up monograph to the reiteration of the final conclusions : (a.) Congenital occlusions are either soft or osseous. The diaphragms of some cases of the former are situated behind the choanæ and behind the Eustachian tube, in the latter always within the nasal cavities. (b.) Congenital atresia of the posterior nares occurs in monstrosities or in viable, otherwise completely or approximately well-developed, individuals. The osseous occlusion is in either case more frequent. (c.) Among viable individuals, whose nasal cavities ended backward into a blind sac, the osseous occlusion is the most frequent. The greater number of the latter are typical cases, the first exact description of which is due to Emmert, while their rhinoscopic picture was first made known by the investigations of Zaufal and Schroetter. According to the experience gathered up to date in these typical cases, bilateral occlusions and those of the right choana appear to be more frequent than those of the left choana. These cases, which greatly resemble each other, bear a certain relation on account of the peculiar structure of the palate to some of the above-mentioned malformations. (d.) The faculty of accommodation of the human system to the congenital atresia of the choanæ is so great as not to necessitate a removal of the trouble in individuals who have passed childhood. Atresia is perilous immediately after birth and during infancy. The most successful cures of this affection are to be expected from pediatrics. (e.) The sense of smell is incompletely or not at all restored in these typical cases. The sensation of taste may be comparatively well developed, even if smell is entirely missing (different volatile oils, *e. g.*, are distinguished and

named). (f.) In congenital osseous occlusions are lapse is much more to be feared after operation than in congenital soft occlusions. Continuous after-treatment with permanent canulas is indispensable for cases of the former kind. (g.) For operation with the galvano-cautery the introduction of the burner through the naso-pharynx, under the guidance of the rhinoscopic mirror, is preferable to that through the nasal meatuses.

3. KAFEMANN bases his conclusions upon observations in the living and principally upon examinations of specimens. The bursa, tonsillar and fibrous, is found exclusively in the limited region of the recessus phar. medius tonsillaris, and is in no case laterally situated. A marked oval fibrous recessus usually corresponds with a more or less scaphoid deepening in the bone, a recessus phar. osseus. He distinguishes a recessus phar. medius tonsillaris and a recessus phar. medius massæ fibrosæ. The latter shows different features, with their mucous membrane without cysts, with their mucous membrane and with formation of cysts, with strong development of mucous membrane without cysts, with thick mucous membrane and with formation of cysts.

II.—PHYSIOLOGY AND PHYSICS.

a.—HEARING ORGAN.

1. HERMANN, L. The relation of the vowels in Edison's new phonograph. (From the Physiological Institute at Koenigsberg.) *Pflüger's Archiv*, vol. xlvii., p. 42.

2. HERMANN, L. Phono-photographic investigations. (From the Physiological Institute at Koenigsberg.) *Pflüger's Archiv*, vol. xlvii., pp. 44 and 347. With one plate.

3. EWALD, Prof. R., Strassburg. Can the trunk of the auditory nerve be excited by sound? *Berliner klin. Wochenschr.*, 1890, August 7th.

4. EWALD, Prof. R. Motor disturbances after injuries to the semicircular canals. *Centralbl. f. d. med. Wissench.*, 1890, pp. 114 and 130.

1. HERMANN intended to examine whether the characteristics of the vowels are fixed or comparatively partial notes. If the cylinders upon which the vowels were impressed were turned during the reproduction too quickly or too slowly, all vowels

sounded very much like a sound between *ae* and *oe* (German). It therefore follows that one of the main characteristics of the vowels is based upon comparatively fixed partial tones.

2. In the first part we find a brief description of the improved photographic method of taking vibratory curves and their mathematical measurement, analysis, and computation, for which we must refer to the original. From the second paper it is worthy of mention that examinations with but one kind of membrane cannot reveal the character of the vowels. Those characteristics of the vowels are far more valuable which remain unchanged in all membranes fit for experiment, whether they present differences in the mode of vibration or not. The appended curves are excellent and very instructive. As the most general characteristic of the vowel curves he found that they contain an upper tone periodical or in periodical increment, and that the period corresponds to that of the voice tone. For the representation of the true characteristics of the vowel curve Hermann considers Fourier's analysis hardly useful, and he principally used the method of counting off and proportional measurement. With reference to the five main vowels, he arrives at the following result: they consist of a comparatively firm mouth tone, which oscillates beat-like during the period of the voice tone in its intensity. The position of these tones is arranged according to the pitch: in U c'-d', O d'-e', A e'-g' sharp, E b'-c', I d'-g'. The almost constant oscillation cannot be referred to the simultaneous vibration of the membrane, but is peculiar to the vowel, as well as the fact that the fundamental tone of the vowel sound appears comparatively little marked. Parallel experiments with Edison's new phonograph confirm these results. After considering the prevailing vowel theories, he lays down a new theory as follows: the essential feature of the vowel is the intermittent or oscillating afflation of the mouth-tone by the voice. It is immaterial whether the period of the voice-tone comprises an exact fraction of the large period or not; in other words, whether the mouth-tone is in harmony with the laryngeal tone. In accordance with these results Hermann tried to produce the vowels synthetically, and he arrived, after experiments with Savart's wheel and with perforation sirens, at the conclusion that beats of sufficient frequency may produce tone. The common differential tones are therefore of a subjective character. With Helmholtz's double siren, when quickly turned, not only the differential tone as

dominant tone could be produced, but this differential tone had the marked character of the vowel O, with greater celerity that of Ao, and with still more rapid turns that of a distinct A.

3. EWALD removed the entire inner ear of pigeons, an operation which lasts on one side from four to six hours. "The trunks of all the branches of the auditory nerve are seen to project from their osseous openings, and I can indeed prove the removal of the entire labyrinth." The pigeons could hear without any doubt. "I succeeded in some cases, by introducing a cauterizing paste, in producing degeneration of the trunk of the acoustic, and in these cases the pigeons became entirely deaf, without additional hearing disturbances." On account of the different views held by aurists on this question the reviewer considers it to be his duty to point out the fact that Ewald has probably left, after removal of the labyrinth, a large part of the endings of the acoustic, which by their attachment render dissection of the entire membranous labyrinth very difficult.

b.—NASO-PHARYNX.

1. ZIEM, C. The deformity of the spinal column in obstructing nasal troubles. *Monatsschr. f. Ohrenheilk.*, etc., 1890, p. 134.

2. PROUHO, M. Note on the sense of smell in the star-fish. (Du sens de l'odorat chez les étoiles de mer.) Presented by de Lacaze-Duthiers. *Compt. rend.*, vol. cx., p. 1343.

1. ZIEM occluded by operation the nostril of a young rabbit, and observed the subsequent pronounced formation of scoliosis of the spinal column. He refers to the possible connection of both troubles in man.

2. The sense of smell of the star-fish is not diffusely spread through the entire body, but localized in the ambulacral tubes, which are unfit for motion, and are situated behind the polypoid extremity (plaque ocellaire).

II.—PATHOLOGY AND THERAPEUTICS.

By A. HARTMANN, BERLIN.

Translated by Dr. MAX TOEPLITZ, New York.

a.—GENERAL LITERATURE.

1. KLINISCHES JAHRBUCH, vol. ii. (Statistics of the clinics and policlinics for aural diseases at the universities of Prussia.) Berlin, 1890, pp. 646 and 652.

2. Prof. SCHWARTZE. Statistics on the attendance of ear patients and students at the royal university ear clinic at Halle, from April 1, 1884, until April 1, 1889. *Arch. f. Ohrenheilk.*, vol. xxix., p. 295.
3. LUDEWIG. Report on the work done at the royal university ear clinic at Halle, from April 1, 1888, until March 31, 1889. *Arch. f. Ohrenheilk.*, vol. xxix., p. 263.
4. SCHUBERT, Nuremberg. Report on the second otological quinquennium. *Arch. f. Ohrenheilk.*, vol. xxx., p. 45.
5. HECKE, O., Breslau. Report on cases observed and operations made at my polyclinic and clinic for aural diseases in the year 1888. *Arch. f. Ohrenheilk.*, vol. xxx., p. 67.
6. RICHARDS, HUNTINGTON. Work in the ear department of the Vanderbilt clinic. *Medical Record*, September 27, 1890.
7. GRADENIGO. The importance of the study of otology (L'importanza dello studio della otologia). Turin, 1890.
8. GOMPERZ, B., Vienna. Earache and its treatment. *Centrabl. f. die gesammte Therapie*, 1890, No. 5.
9. STEIN, STANISLAUS VON, Moscow. Resorcin combined with cocaine in aural diseases. *Monatsschr. f. Ohrenheilk.*, 1890, No. 3.
10. Prof. E. ZAUFAL. Bacteriological contributions to otitis media in influenza. *Prager med. Wochenschr.*, 1890, No. 8.
11. HABERMANN. Contributions to the study of ear affections in influenza. *Prager med. Wochenschr.*, 1890, No. 8.
12. Prof. Dr. A. POLITZER. Diseases of the hearing organ during the last epidemic of influenza. *Wiener med. Blätter*, Nos. 9 and 10.
13. Prof. Dr. GRUBER. Diseases of the hearing organ during the last epidemic of influenza. *Allgem. Wiener med. Ztg.*, 1890, No. 10.
14. EITELBERG, A. Influenza and otitis media (L'influenza et l'otite moyenne). *Archivio internazionale de laryngologia, otologia, et rinologia*.
15. IDEM. Aural affections in influenza. *Wiener med. Presse*, 1890, No. 7.
16. LOEWENBERG, Paris. Ear complications during the present epidemic of influenza (Les complications auriculaires dans l'épidémie actuelle d'influenza). *Bull. méd.*, 1890, No. 3.

17. MÉNIÈRE, Paris. Ear complications of the grippe (Complications auriculaires de la grippe). *Soc. franç. otol. et laryngol.*, May 10, 1890.

18. LANNOIS. Deafness of the labyrinth following the grippe (Surdité labyrinthique consécutive à la grippe). *Revue de laryngol.*, 1890, No. 17.

19. ROHRER, Zurich. Affections of the ear in influenza. *Archiv f. Ohrenheilk.*, vol. xxx., p. 119.

20. SCHWENDT, A., Bâle. Diseases of the hearing organ caused by influenza. Bâle, 1890.

21. JANKAN, LUDWIG, Strassburg, Otitis media following influenza. *Deutsche med. Wochenschr.*, 1890, No. 12.

22. SCHWABACH, Berlin. Otitis media acuta in influenza. *Berliner klin. Wochenschr.*, 1890, No. 3.

23. KATZ, L., Berlin. Aural diseases in influenza. *Therapeutische Monatsh.*, 1890, No. 2.

24. MICHAEL I., Hamburg. The nature of influenza, with special reference to aural symptoms. *Deutsche med. Wochenschr.*, 1890, No. 6.

25. Prof. ROBERT LEUDET, Rouen. Aural hemorrhage in hypertrophic cirrhosis (Otorrhagie dans la cirrhose hypertrophique). *Annal. des mal. de l'oreille*, etc., 1890, No. 10.

26. MORPURGO, Triest. The condition of the hearing organ in tabes. *Arch. f. Ohrenheilk.*, vol. xxx., p. 26.

27. IDEM. Tabes of the hearing organ in tabes dorsalis (Sulla tabe dell'organo auditivo nella tabe dorsale). *Boll. delle malattie dell'orecchio*, etc., 1890, No. 1.

28. HABERMANN, I., Prague. Hardness of hearing in boiler-makers. *Arch. f. Ohrenheilk.*, vol. xxx., p. 1.

29. NOËL. Effect of detonations upon the ear (De l'action des détonations sur l'oreille). *Bull. méd.*, 1890, Oct. 1.

30. MANOURRIER. Localization of aural sensations (Localisations des sensations auditives). *Soc. d'anthropologie de Paris*. March, 1890.

31. SCHWENDT, A. Deaf-mutism, its cause and prevention. *Lectureship paper*, Bâle, 1890.

32. LONGHI, Pavia. Deafness, deaf-mutism, and the Institute Ototerapico.

33. LANNOIS, Lyon. Deaf-mutism, and the deaf-mutes before the law (*La surdi-mutité et les sourds-muets devant la loi*), Paris, 1889.

34. The sanitary service in the German armies during the war against France, 1870-71. Vol. v., No. iii. Surg. part: C. Cases of large operations. Berlin, Mitler & Son, 1884. Vol. iii., Spec. part, Surg. part, a Injuries to the head and body. *Ibidem*. 1888, x.; *Cp. Chir. Centralbl.*, No. 49, 1889.

1. In the royal Prussian university clinics and policlinics for aural diseases, the following cases underwent treatment during the clinical year 1888-89.

	Berlin.	Bonn.	Göttingen.	Greifswald.	Halle	Koenigsberg.
I. Auricle	106	59	49	16	28	19
II. External meatus	1425	364	513	94	280	167
III. Membrana tympani . . .	32	21	10	93	15	2
IV. Middle ear	3902	811	953	337	1572	534
V. Inner ear	191	16	74	11	79	31
VI. Caries of temporal bone .	2	91	—	6	—	—
VII. Diseases of the nose and naso-pharynx	201	855	220	103	100	533
VIII. Other diseases	15	16	8	—	—	—
Number of treated cases . . .	5879	2233	1827	660	2074	1286
Number of treated persons . .	4758	—	1407	334	1875	788

The number of students and physicians attending the clinics and policlinics during the summer semester, 1888, and during the winter semester, 1888-89, was as follows :

	Summer Semester, 1888. Students and Physicians.	Winter Semester, 1888-89. Students and Physicians.
Berlin	20	19
Bonn	59	28
Göttingen	29	16
Halle	47	44
Koenigsberg	31	7

2. In the in-door clinic at Halle, 620 persons were admitted during five years, and 6,041 were treated at the policlinic. The

lectures were attended by 283 students, and 37 physicians attended the clinic for instruction.

RÜMLER (Berlin).

3. One thousand five hundred and fifteen patients, with 2,070 diseases, were treated in Halle, during the clinical year, 1888-89. One hundred and sixty-six persons were admitted to the indoor clinic. Among the latter was a child, in whom a sharply edged stone was pushed into the tympanum by improper attempts of extraction. The difficult removal was successfully performed by means of Zaufal's lever, which is always used with predilection. Of especial interest are: A case of bilateral microtia and atresia of the external meatus; unsuccessful attempt at restoring the latter; pyæmia with recovery. Tuberculosis of the ear: Patient with advanced phthisis pulmonum underwent treatment for a painless otitis purulenta dextra. There was in front of the handle of the malleus a roundish perforation, and in the posterior segment three ulcers at different stages. Ten cases with syphilis, five of which were acquired, and five hereditary. Of the clinical patients ten died, whose histories are fully reported. Fifty chisellings of the mastoid process were performed.

RÜMLER.

4. SCHUBERT treated 3,316 ear patients from June 1, 1884, until May 31, 1889. Among the classified diseases, "a polypus of the external meatus, is worthy of mention." Below cerumen and epithelial masses a polypus appears, which is inserted into the anterior wall of the osseous meatus, whereas the drum membrane is uninjured and without inflammation. Schubert's views upon suppurations of the middle ear, associated with perforations of Shrapnell's membrane, claim especial attention. He arrives at the following result: "With increased experience I become more firmly convinced, that by far the majority of these cases can be cured by operation only." Schubert's view upon "the removal of the carious hammer, being necessitated by general surgical principles," is in accordance with the present opinions of aurists. In two cases the function of the ear was not interfered with after excision of the malleus. The opening of the mastoid process was found to be necessary in twenty-one cases. In one case primary otitis of the mastoid without affection of the tympanum was present. Among nasal diseases, only the empyema of Highmore's antrum is discussed.

RÜMLER.

5. HECKE treated 385 patients in his policlinic. In three cases the drum-membrane and the malleus were excised, one of

which showed improvement of hearing, and the two others no impairment. The chiselling of the mastoid process and the opening of the antrum were performed in eighteen cases, of which eight were cured, three died and seven remained under treatment.

RUMLER.

6. RICHARDS reports that from the opening of the ear department of the Vanderbilt clinic, January 1, 1888, up to May 24, 1890, 1,500 cases have been entered. It appears the histories of the cases are kept very fully and elaborately. Chron. median catarrh forms, of course, the larger number, 595 cases being recorded; chronic purulent otitis comes next with 431 cases, while there were 539 cases of acute otitis. Three operations on the mastoid were performed, two successful.

SWAN M. BURNETT.

7. GRADENIGO argues upon the importance of the study of otology. In Italy clinical instruction exists only at the universities of Rome, Turin, Milan, Naples, and Florence.

8. GOMPERZ discusses the methods of treatment of the different aural diseases associated with otalgia. We emphasize the recommendation of Gruber's treatment of aural furunculosis with gelatine preparations. (B Extr. opii aquosi 0.1, gelatinæ albæ, q. s. u. f. amygdalæ aurium [Gruber] No. x.) Gomperz saw the furuncles disappear in a brief period "with a certain regularity," and the pain to abate. For the relief of pain in otitis media acuta Gomperz recommends instillations of warm solutions of cocaine of 5 to 10 per cent., which may be also injected through the catheter. Early paracentesis. In otalgia nervosa Gomperz has found antipyrine to answer the indication best.

9. Resorcin introduced into otology, by de Rossi, according to STEIN'S synopsis from literature, has an antiseptic, analgetic, vaso-constrictor, and antiphlogistic action, furthers the epithelial regeneration; it acts, however, but slowly and superficially. Cocaine allays pain, diminishes secretion, is but little antiseptic, and increases the faculty of absorbing, especially in hyperæmic tissues, since, when instilled more frequently, it macerates the epithelium of the membrana tympani and readily produces symptoms of intoxication in acute processes. Stein uses a combination of resorcin 0.1, cocain. muriat. 0.2-0.5, aq. dest. 10.0 (to which morph. 0.01-0.05 is added when pain is present), in children and adults. A few drops of the warm solution are instilled two

to four times daily into the ear and removed with cotton after five to fifteen minutes. The auricle should be treated with ointments before and after the instillation, in order to avoid itching and eczema. After an experience of three years and a half. Stein recommends this treatment in myringitis acuta, otitis med, acut. catarrh. (also especially in the later stage), and otitis med. chron. catarrh.; in perforations the ear should be previously syringed with solutions of boric acid; in sclerosis the drug should be injected per tubam, and in purulent otitis the remedy is of value with not too large perforations (granulations may disappear without cauterizations). KILLIAN, Freiburg.

10. ZAUFAL found in a case of otitis media, following influenza, the streptococcus pyogenes in the secretions of the tympanum, in a second case the diplococcus pneumoniae, A. FRAENKEL-WEICHSELBAUM (Finkler found the streptococcus pyogenes in one case, and associated with this the staphylococcus pyogenes albus in another).

11. HABERMANN reports thirty-nine cases of otitis media in influenza.

12. POLITZER divides the cases he observed into two classes: (a) affection of the hearing organ during influenza or after it in individuals with previously normal ears; and (b) exacerbations and relapses of previous aural affections. The cases of the first class are frequently distinguished from other genuine otitides by their great intensity. In a number of cases myringitis bullosa hemorrhagica, which has been first described by Politzer, was observed; intense pain and annoying objective noises persisted in some cases, after the perforation of the membrana tympani had closed, for days and weeks. The course taken by the purulent otitis with perforation of the membrana tympani was in many cases of long duration and led frequently to formation of abscess in the mastoid process. The treatment paid especial attention to the allaying of pain; it differed, however, not materially from the usual methods. NOLTENIUS, Bremen.

13. GRUBER emphasizes, in accordance with all other authors, that extreme hyperæmia of the affected structures, intense pain, and comparatively frequent implication of the mastoid process have been the foremost features of interest. The author holds, that the process of the ear could frequently not be considered as transferred from the naso-pharynx, but as an independent affection of the ear. NOLTENIUS.

14 and 15. EITELBERG agrees with other authors, that intense hyperæmia of the diseased structures associated with intense pain is characteristic of the aural affections due to influenza; he emphasizes, however, the mostly favorable and rapid course of the affection, and reports among a large number of these observations only one case of transmission of the affection to the mastoid process so as to necessitate its direct treatment. The histories illustrate his views. NOLTENIUS.

16. LOEWENBERG has observed twenty cases of otitis media following influenza. The symptoms are as follows: intense pain which disappears after the establishment of perforation, rapid recovery. He does not mention hemorrhages.

17. MÉNIÈRE gives statistics of the cases of his own observation and arrives at the following conclusions: (a) Rapid affection of the middle ear with marked local and general symptoms at the beginning, profuse purulent discharge, inflammation of the periosteum, and of the mastoid cells. (b) Rapid improvement, recovery without disturbances in the ear, formation of cicatrices in the membrana tympani, normal hearing. (c) Good result of antiseptic treatment and of injections. GELLÉ, Paris.

18. LANNOIS reports two cases in which the grippe had comparatively slightly affected the middle ear, but had led to severe disturbances in the labyrinth. In the observation sudden and complete deafness, subjective intense noises and an almost permanent vertiginous condition were noted. In the second case there was slight otitis media with almost complete deafness, the absent perception of the tuning-fork proving a lesion of the inner ear. GELLÉ.

19-24. ROHRER observed in the acute inflammations due to influenza in only one case an extraordinary course, viz., a hemorrhage, which continued to a slight extent for two days and was caused by erosion of vessels of the drum-membrane during perforation of the membrane. The other authors, SCHWENDT, JANKAN, SCHWABACH, KATZ, and MICHAEL, emphasize in opposition to Rohrer's view the frequent appearance of severe hemorrhagic inflammation of the drum-membrane. The membrana tympani reveals intense redness and in some cases hemorrhages into its tissue. The course of otitis in influenza is concurrently described as not unfavorable in spite of the great intensity of the symptoms at the beginning. Schwabach observed among sixty-two cases two perforations of Shrapnell's membrane.

25. Hemorrhage from the ear is one of the rarest hemorrhages in liver troubles. The hemorrhages occur, according to their frequency, as follows: nasal, oral, intestinal, stomach, and cutaneous bleedings, still rarer are the bronchial hemorrhages, while the nephritic and pulmonary ones come last. In the entire list of classical treatises LEUDET does not find the aural hemorrhage mentioned; in his own practice he has met with but one case, which he published at the time it occurred. This patient had entered the hospital for hypertrophic liver cirrhosis, and was seized at night for the first time with quite a profuse aural bleeding. Two days later an additional hemorrhage, more profuse than the first one and again from the left ear. The patient had up to date never noticed a bleeding from the ears. Since that day the patient has bled every day from the ear, but less profusely than the first time. Unfortunately the patient left the hospital without an examination of the ear.

GELLÉ.

26 and 27. MORPURGO examined fifty-three patients with tabes with reference to the condition of the hearing organ, and arrived at the surprising result, that there were among them but ten with normal hearing. Among these forty-three ear patients there were thirty-five cases with bilateral positive Rinné, among which were several with exquisite positive result, in some cases with a hearing power (for whisper) of 20 cm; in twenty-six cases of bilateral positive Rinné the drum-membrane was normal. Ear inflation improved the hearing power only in three cases. The hearing faculty was on the whole uniformly preserved for different pitch of tone. Morpurgo infers from these facts "that altogether an affection of the sound-perceiving apparatus is found."

RUMLER.

28. HABERMANN examines the hearing organs of a patient suffering from boiler-maker deafness. For the explanation of the histological condition he first makes himself acquainted with the functional disturbances as observed in a large number (thirty-one) of living boiler-makers. He found in all persons examined a more or less marked degree of hardness of hearing. It is noteworthy that the loud voice was heard comparatively better than the whisper. In all persons the bone-conduction for the tuning-fork C (128 vibrations) and also the aërial conduction were diminished respectively. Rinné's experiment had in all cases a pronounced positive result. The hearing for the highest notes was extremely diminished. Pathological changes were

missing in the middle ear. It is of considerable interest to note that in some boiler-makers, in whom an affection of the middle ear was found, the hearing was comparatively better than in those with normal middle ear. Habermann considers, therefore, the impediment of sound transmission as a protecting apparatus against the injurious action of too strong noises. Subjective noises were found in fifty per cent. of the cases ; naso-pharyngeal catarrh only in six cases. The hearing organs, which were examined histologically, were taken from a man seventy-five years of age, who had been working for twenty years in copper works where loud noises existed. The macroscopical examination of both hearing organs reveals their normal condition. From the result of the microscopical examination we emphasize the following points : Atrophy of the nerve trunks in the entire inner ear. In the basal cochlear turn there were found in the canalis ganglionaris but a few ganglionic cells, and the canal was filled besides with mucoid connective tissue ; in place of Corti's organ there was an indistinct mass of cells. Towards the cupola of the cochlea the structures were found to be normal. Habermann points out especially the condition of both windows. The basal plate of the stapes appeared in its anterior half drawn extremely outward, and its hindermost portion was moved inward to a large extent, thus being in a position as it is produced by an extreme pull of the stapedius muscle. The membrane of the round window was somewhat bulged towards the tympanic cavity. In the left hearing organ approximately the same condition. Habermann supposes "that, through the permanent excessive excitement of the nervous end-apparatus of the inner ear, a diminution of its excitability, in the basal turn, respectively, a paralysis, occurred, which led further to degeneration of Corti's organ placed out of function, and further to an ascending atrophy of the respective nerves." Habermann explained the extreme outward dislocation of both basal stapedial plates by a contraction of the *Mm. stapedii* caused by continued action of intense sound, probably also of high pitch.

RUMLER.

29. NOËL commences with an historical review of the subject. The different accidents in consequence of detonations may be classed into the following four groups : (a) hypersecretion of cerumen ; (b) rupture of the *membrana tympani* ; (c) disturbances of hearing ; (d) reflex troubles. The hypersecretion of cerumen was first described by Dr. Mourton. The rupture of the drum

membrane, with its usual symptoms, is well known. The disturbances of hearing are caused by hyper-irritation of the auditory nerve corresponding to that of the optic nerve in strong luminous impressions. It may be added that Holt believes that the affection of boiler-makers is due to ankylosis of the ossicles. Duplay supposes a lesion of the inner ear caused by detonations. The reflex disturbances are as follows : involuntary inflection of the head, diarrhœa, nausea, vertigo, headache, lancinating pain in the pharynx. Challes and Minnier have recorded six observations of deaf-mutism—at times epilepsy or epileptoid tremor. In order to prevent the disturbances, Ferrant has devised an apparatus, two instruments adapted to the form of the auricle, which are attached by a band placed over the vertex. They were tried during firing exercises, and seemed to render good services.

GELLÉ.

30. MANOURRIER has found in different brains of executed persons differences in the appearance of the first temporal convolution in deaf individuals, whose middle ear was the seat of old lesions. He has observed simultaneously in the same individuals a more marked development of the facial centres (*pli courbe*) of the opposite side. This was seen in the case of Dr. Bertillon, who was deaf in one ear. At the autopsy Dr. Manourrier has made interesting investigations with reference to this point. GELLÉ.

31-33. SCHWENDT and LONGHI give a general description of all the conditions concerned in deaf-mutism, also LANNOIS, who points out that the intelligence of deaf-mutes is not interfered with ; so that good education is quite possible.

34. Injuries to the external auditory meatus were readily followed by stenosis, and even complete occlusion, causing considerable diminution of the hearing power. The operative restitution in one case was followed by considerable improvement of the hearing. Shells bursting in immediate neighborhood, or projectiles of large or small calibre rushing by, but principally, bruising and grazing shots in adjoining parts caused ruptures of the *membrana tympani*, and deafness. The latter was indeed most frequently caused by immediate injury to the aural region, or by fractures of bones beginning at other places, but extending in to the temporal bone or the middle ear respectively. Disturbances of the sensations of smell and taste were rare consequences of wounds of the skull ; disturbances of speech, however, occurred frequently in consequence of injury to the speech-

centre. In some cases complete and permanent, in others temporary complete or partial loss, finally but temporary or permanent impediment of speech. The left parietal bone usually forms the place of penetration for the projectiles; other bones of the skull, in rare cases, in which the projectile had reached, after penetration, the respective cerebral part. A Frenchman with fracture of the tibia became speechless with cerebral paroxysms following erysipelas, probably in consequence of paralysis of the speech-centre due to cerebral œdema. Moos.

b.—INSTRUMENTS AND METHODS OF EXAMINATION.

35. GELLÉ. Novel procedures of auto-examinations of the functions of the hearing organ (Nouveaux procédés d'auto-examen des fonctions de l'organe de l'ouïe). *Annal. des mal. de l'oreille*, etc., 1890, No. 9.

36. IDEM. Signs derived from the comparison of the results of hearing and from the auscultation of the diapason vertex during deglutition and the other different modes of moving the auricular conducting apparatus (Signes tirées de la comparaison des résultats de l'audition et de l'auscultation du diapason vertex pendant la déglutition et les divers autres modes de mobiliser l'appareil auriculaire). *Mém. lu à la Soc. franç. d'otologie*, May, 1890.

37. RETHI. A new snare. *Wiener klin. Wochenschr.*, 1890, No. 4.

38. RETTIG, A., Saarbrücken. The audiphones (Die "Tonbringer"). *Monatsschr. f. Ohrenheilk.*, 1890, Nos. 5 and 6.

39. KATZ, Berlin. A holder for auscultation tubes. *Arch. f. Ohrenh.*, vol. xxx. p. 124.

40. VOHSEN., Frankfort-on-the-Main. Contribution to the electric illumination and translumination of cavities. *Berliner klin. Wochenschr.*, 1890, No. 12.

41. Prof. Dr. TRAUTMANN. Electric illumination apparatus for ear, nose, naso-pharynx, etc. *Deutsche med. Wochenschr.*, 1890, No. 15.

42. FLATAU, Berlin. An instrument for the fixation of Voltolini's nasal speculum. *Berliner klin. Wochenschr.*, 1890, No. 25.

43. BABER CRESSWELL, Brighton. Further remarks on the self-retaining palate-hook, including its use in post-nasal catheterism. *Brit. Med. Jour.*, June 28, 1890.

44. HOPMANN, Cologne. Palate-hook with elastic traction. *Monatsschr. f. Ohrenheilk.*, 1890, No. 5.

45. NOLTENIUS, Bremen. Mirror separable from reflector for demonstration of the laryngeal, naso-pharyngeal, nasal, and aural cavities, and also for auto-laryngoscopy of the patient. *Therapeutische Monatshefte*, 1890, No. 2.

46. PINS, Vienna. Novel method for nasal irrigations. *Wiener med. Wochenschr.*, 1890, No. 16.

35. GELLÉ established, from a series of experiments in which the tuning-fork was placed upon the vertex, the following changes in the hearing: (a) In the normal ear the cranial tone is changed with every in- and expiration through the tube connecting the mouth with the ear. A low snapping noise is simultaneously heard. The mobility and elasticity of the membrana tympani are equally perceptible, as well as that of the stapes. (b) The tone of the diapason vertex, which is central-median, is perceived on the side of the tube immediately after it has been introduced into the mouth; the resonance of the oral cavity produces this lateral displacement. If the mouth-piece is obstructed with the tip of the tongue, the sensation becomes, at will, lateral or median. (c) Contraction of the masticatory muscles decreases the tone of the diapason vertex. (d) The same effect is produced by contraction of the facial skin. The author then recommends to press the mouth-piece between the molar teeth. These different experiments furnish an important aid to auto-observation of the hearing organ. GELLÉ.

36. GELLÉ was frequently astonished at the difference between the results of examinations made with the otoscope, in which he auscultated the tone of the diapason vertex, and those which the patient himself stated he perceived. Various pathologico-anatomical conditions lead to concordant or opposite results. Under physiological conditions there exists an absolute accordance between the sensations of the patient and of the physician; this is a sign of good health of the organ and its movements. In case of disease, the results of examination may both be negative—viz., the tone of the diapason vertex does not undergo any change during the deglutition of the patient; and the physician has not

noticed any change. The author has confirmed these negative results in case of immobility of the drum-membrane, if the tube has been impervious for a long time. As long as the conducting apparatus is movable, both positive experiments may be in accordance, whatever the affection of the hearing organ may be. The most interesting cases are those in which the patient does not perceive any modification of the tone of the diapason vertex during deglutition, although the observer finds the decrease of the vertex tone. The non-concordant results are, the author thinks, very significative. Hence follows the loss of mobility of the stapes and the ossicles, whereas the mobility and elasticity of the membrana tympani are preserved. The other clinical appearances prove the correctness of the explanation of these observations.

GELLÉ.

37. RETHI, in order to facilitate the removal of the posterior extremities of the turbinated bodies by means of the snare, has provided the end of the snare with a joint for lateral movement. This is executed by a rod which is firmly attached to the instrument. An illustration of the instrument is added. NOLTENIUS.

38. RETTIG belived the suitably formed paraboloid to be an acoustic expedient, which may be compared with the spectacles, the telescope, or microscope. The tone is greatly increased by the concentration of the sound waves and by the simultaneous oscillation of the paraboloid. A new tone-centre thereby develops in the immediate neighborhood of the hearer. The increase of tone being the largest if the paraboloid is directed toward the source of sound ; the waves thus entering in the direction of the axis, the direction from which a sound approaches is readily recognized. Laterally entering waves are increased only by paraboloids with short focus. Wide-open and flat paraboloids do not increase the tone ; they eliminate, however, disturbing accessory noises. The troublesome resonance of the walls of the paraboloid may be removed by dampness. Rettig's apparatuses might be used : 1. For persons with normal hearing for the distinction of the lowest sounds and for large distances (direct telephony, etc., for medical purposes). 2. For deaf persons, in whom they may act also by bone-conduction. Speaking into the apparatus is unnecessary.

KILLIAN, Freiburg.

39. The instrument consists of two curved pieces of metal which can be moved upon each other, in order to fasten the simple rubber tube.

40. VOHSEN uses for illumination a modification of the diaphotoscope of Schütz, which represents a self-illuminating, centrally perforated reflector, and furnishes *one* examining eye with the same intensity of light as *both*. Vohsen is very well satisfied with the apparatus, which he has used for a year. He also devised an instrument for the translumination of the following organs, larynx, trachea, and nose, which he described and tried. He arrives at the result that the translumination is a valuable aid for the diagnosis of nasal affections, and principally those of Highmore's antrum.

RUMLER.

41. TRAUTMANN uses for examination a plane mirror with a handle, to the anterior surface of which a small incandescent lamp is attached. The light may be produced by a battery, or by accumulators.

42. The instrument is attached by means of a pelotte, which is fastened to the forehead by means of a truss spring placed sagittally over the patient's head. For details, see the drawing.

RUMLER.

43. In this communication Dr. BABER gives an account of his further experience in the use of a palate-hook devised by him and described in a former number of the *Journal* (Jan'y 12th). With the help of this hook, brilliant illumination of the nasopharynx is possible and a catheter can with a little manipulation be introduced into the orifice of the Eustachian tube through the mouth. The catheter used by Dr. Baber differs somewhat from those of Cutter, of Boston, and Fick and Kessel, inasmuch as its curves are all in the same plane, in this respect resembling the ordinary Eustachian catheter for use through the nose.

URBAN PRITCHARD, London.

44. HOPMANN's palate-hook consists of a rod, 15 *cm* long, which broadens and curves in front like the usual palate-hooks, and provided with the sliding bar with two wing-like attachments as points of support for the index and middle-finger. The lateral hooks upon the rod and sliding-bar hold two rubber rings. The latter are stretched by pulling back the sliding-bar while the thumb presses upon the end of the rod. The instrument is thus introduced and attached with one hand. The wing-like attachments press against the upper lip; the stretched rubber rings hold the entire instrument in its position and draw the velum palati forward. The holder, when made of aluminium, weighs but 9.5 grammes. On account of its lightness and the absence

of irritation of the mucous membranes from aluminium, cocainization is mostly unnecessary. KILLIAN.

45. The arrangement devised originally by Peppmüller for the ophthalmoscope is transferred by Joël to the larygoscope. NOLTENIUS has corrected various faults, by giving the mirror for demonstration a trapezoid form with curved limitation of the lateral margin instead of the heretofore rectangular form; secondly, by making the mirror separable; and thirdly, by lessening the angle of inclination. JENS, Berlin.

46. Two glass tubes of different length are inserted into the double perforated and hermetically closing stopper of a bottle of any size. To the free end of longer tube reaching to the bottom of the vessel an olive with wide opening for one nostril is attached, while the shorter one is bent at a right angle above the stopper and is provided with a mouth-piece. The patient blows vigorously into the bottle, filled previously with the solution, and thereby forces the fluid through the nose during involuntary but energetic occlusion of the naso-pharynx by means of contraction of the velum palati. The fluid ought not to enter the frontal cavities or the tubes. The procedure is contra-indicated only in pulmonary emphysema, and also in affections of the heart and of the large vessels, on account of the high pressure during expiration. NOLTENIUS.

C.—EXTERNAL EAR.

47. HAMON DU FOUGERAY. Two cases of epithelioma of the auricle (*Deux cas d'épithélioma du pavillon de l'oreille*). *Annal. des mal. de l'oreille*, etc., April, 1890.

47 a. BISHOP, S. S. Imperforate auditory canals. *Four. Amer. Med. Assoc.*, Sept. 20, 1890.

48. THEOBALD, SAMUEL. Report of a case in which a septum closely resembling the tympanic membrane formed in the middle third of the external auditory canal and was removed, with improvement to hearing. *Trans. Amer. Otol. Soc.*, 1890.

49. Prof. Dr. POLITZER, Vienna. Anatomical and clinical studies on the acquired atresia of the external auditory meatus. *Wien. med. Wochenschr.*, 1890, Nos. 20 and 21.

50. SZUMLANSKI, Warsaw. Contribution to the congenital malformation of the external ear. *Gazeta Lekarska*, 1890, No. 20.

51. KELLER, C., Cologne. The value of collodium treatment in relaxed membranæ tympani. *Monatsschr. f. Ohrenheilk.*, 1890, No. 1.

52. COUSINS, J. WARD. The value of the new antiseptic artificial membrana tympani. *Amer. Jour. of Med. Sciences*, February, 1890.

53. HAUG, RUDOLF, Munich. The artificial membrana tympani and the methods proposed for its substitution. An otological study. Published by Th. Ackermann, 1889.

54. BARCLAY, ROBERT. The use of the paper disc ; case histories. *Trans. Amer. Otol. Society*, 1890.

55. LUDEWIG. Communication of cases. *Arch. f. Ohrenheilk.*, vol. xxiv., p. 234.

47. Epithelioma of the auricle is a rare affection. Dr. Ferreri has noticed but eight cases of epithelioma among 5,000 ear patients. Gaillet has published eleven observations, and O'Green eighteen. An extensive and timely operation is required. Thermocautery is preferred by FOUGERAY. GELLÉ.

47 a. BISHOP's cases are : (a) a man of thirty-two years had the auricle torn off, and when it was replaced by the surgeon the auditory canal was covered over. An opening made in the cicatricial tissue covering the meatus restored useful hearing ; (b) congenital closure of meatus on one side,—no interference ; (c) same as case b ; (d) auricle torn off, and when replaced the meatus was covered as in case a. The cicatricial tissue which covered and partly filled the canal was cut away and a small opening remained through which he had satisfactory hearing.

SWAN M. BURNETT.

48. THEOBALD's case was a woman of thirty-nine years with a history of long-standing deafness with discharge. She said a piece of bone had been discharged from the ear. A septum, which in its appearance resembled the normal membrana tympani, was found across the middle third of the external auditory canal, completely closing it. It moved on performing Valsalva's experiment. The septum was incised and hearing was somewhat improved, and still further improved by a cotton artificial membrane. The normal membrane had been entirely destroyed. There was still some remaining otorrhœa.

SWAN M. BURNETT.

49. A polypus, which had been repeatedly extirpated, and always relapsed, led to total adhesion with the walls of the external meatus, to complete deafness, and gradually developing facial paralysis. Death several years later from marasmus senilis. Autopsy. External meatus and upper portion of tympanic cavity filled with tense proliferations of connective tissue ; no trace of

drum-membrane and ossicles, and cholesteatomatous masses in the middle and lower part of the cavum tympani. The tumor extends from the cupola through the Fallopian canal into the meatus auditorius internus, thence into the cochlear cavity and into the vestibule. Cochlea filled entirely, anterior and posterior ampullæ and canales semicirculares free. Backward from the pyramid several tumors of the size of a hazel-nut and smaller, lined with thickened dura and connected with the proliferation of connective tissue of the inner auditory meatus. In a second case, bilateral atresia of the osseous part of the external auditory meatus. Malleus partly displaced from the membrana tympani and adherent to the promontory. The mass of connective tissue is lined by several layers of epithelium; its inner structure is loose, and it resembles an angioma with fat cells, amorphous pigment, and cystic cavities. The membrana tympani is only in its lower position firmly attached to the tumor. The fold between the membrana tympani and the apparently detached malleus proved to be the stretched substance of the membrana tympani. The author emphasizes the necessity of persistent removal of granulations sprouting at the bottom of the external auditory meatus in order to prevent the above-described consequences. NOLTENIUS.

50. SZUMLANSKI, in his patient, a girl aged seventeen, who complained of pain in the region of the right ear and of deafness in the same since her birth, found the following condition: The right helix was much larger than the left, and rolled up in such a manner as to direct its free margin in its upper portion downward, in the lower to the front. The anthelix formed a small projection, which, formed like a transversely situated "V," surrounded the spina helices from above and below; the antitragus was located closely below the spina helices, and covered for the greater part from the rear the opening of the external auditory meatus. The crura furcata, the fossa interfurcata, and the tragus were absent. There existed, of course, no incisura intertragica. The lower portion of the auricle appeared as a long, smooth, fleshy lobulus. The external meatus was closed; after pushing the auricle backward a blind sack was observed, 5 mm long, which was directed inward and somewhat back and upward, and was lined with epidermis. The hearing power seemed to be entirely missing, but the bone-conduction was apparently preserved; patient lacked intelligence. No other abnormal relations. An operation was not attempted. SREBERNY, Warsaw.

51. KELLER has again tried collodium, recommended by M'Keown (Belfast) for different affections of the membrana tympani, in total or partial relaxation of the drum-membrane. He instilled, after preceding air-inflation, the collodium through the ear speculum into the external auditory meatus, the patient's head being laterally inclined. The fluid in excess was imbibed by cotton. The head remained in the lateral position until the collodium had dried. The procedure had eventually to be repeated. The collodium membrane remained for three or four weeks upon the membrana tympani. The successful result of this treatment consisted in the wellnigh or entirely complete disappearance of the unpleasant sensation caused by the membrana tympani moving to and fro, and that of the painful sensations perceived in high and shrill notes. This is due, according to Keller, to the diminution of the capability of oscillation of the relaxed membrane. After the detachment of the collodium covering, the membrana tympani is stated to exhibit an increase of tension. Decrease of hearing power is frequently missing in relaxation of the membrana tympani. Keller does not mention especially whether an improvement of hearing takes place on account of the employment of collodium in cases with impaired hearing. He prefers this method to others, which are mostly more severe.

KILLIAN.

52. WARD COUSINS reports great satisfaction with his further experience in the use of his new antiseptic artificial membrana tympani. The most striking successes have been in those cases where there was a perforation and in 130 cases of this character only five or six have not been benefited more or less. The immediate improvement in hearing power is often very great.

SWAN M. BURNETT.

53. HAUG gives a brief historical synopsis of the methods of occluding perforations of the membrana tympani, and discusses the mode of action of artificial membranes and the eventual injurious consequences of aural suppurations. The author then reviews the experiments which attempt to heal the persistent opening by transplantations, principally those made by Berthold, Ely, Tangemann, and he reports two transplantations which he has performed. At the conclusion he mentions the use of the egg-shell membrane.

54. BARCLAY relates the histories of nine cases of perforation of the membrana tympani, some of them large, associated with

middle-ear disease, in which the paper disk of Blake was used with benefit. The hearing in nearly all cases was improved at once, and the perforation healed nicely.

SWAN M. BURNETT.

55. (1) Perilous bleeding in paracentesis of the membrana tympani through injury to the bulbus venæ jugularis. In front of the paracentesis there appeared a marked blue coloring of the posterior, lower quadrant of the membrana tympani; in the anterior portion the boundary of the exudation was pronounced by a yellow line. Dilatation of the incision to the lower margin of the membrana tympani. Intense bleeding stopped by plugging. Recovery without reaction. (2.) Rupture of membrana tympani caused by lightning. A day after the injury the patient noticed considerable bilateral hardness of hearing. There was found on examination of the right ear a perforation, of about the size of a pea and of the shape of a kidney, in the posterior segment, with the margins turned inward, which LUDEWIG considers as a primary rupture caused by lightning.

RUMLER.

[*To be concluded in the next number.*]

MISCELLANEOUS NOTES AND NEWS.

SOCIETY MEETINGS.

WEST KENT MEDICO-CHIRURGICAL SOCIETY, Nov. 11, 1890.—Mr. Mark Hovel read a paper on "Adenoid Growths in the Naso-Pharynx." He pointed out that the three chief symptoms were (1) dulness of expression, (2) open mouth, (3) snoring; occasionally conjunctivitis and other ophthalmic disorders were induced. In operating, he prefers the forceps and objects to scraping.

BRITISH MEDICAL ASSOCIATION.—*South Wales and Monmouthshire Branch.*—At a meeting held at Abergavenny in November, Dr. Paterson, of Cardiff, read a paper on "Post-Nasal Growths in Relation to Throat and Ear Disease."

HUNTERIAN SOCIETY.—At the meeting of this society on November 26th, Mr. G. H. Jackson recorded a case of tinnitus induced by a small fragment of iron which had been blown into the ear.

CLINICAL SOCIETY OF MANCHESTER.—At a meeting held on December 16th, Dr. Mulligan and Mr. Herbert Lund showed a case in which the mastoid antrum had been opened for acute catarrh of the tympanum secondary to influenza. About a drachm of pus was evacuated, and the healing was completed in three weeks. Mr. Lund suggested the advisability of opening the antrum in all chronic cases, so as to limit the risk of subsequent brain infection.

APPOINTMENTS.

G. L. CHEATLE, F. R. C. S., Clinical Assistant to the Royal Ear Hospital, London.

DR. GRADENIGO, Professor of Otology in the University of Turin.

DR. E. MADDOX, Ophthalmic Surgeon to the Edinburgh Deaf and Dumb Institution.

DR. E. HORSLEY, Aural Surgeon to the Edinburgh Deaf and Dumb Institution.

H. SECKER-WALKER, F. R. C. S., Assistant Ophthalmic and Aural Surgeon to the Leeds General Infirmary.

R. HERRICK, M.B., Assistant Surgeon to the Nottingham Throat and Ear Hospital.

DR. B. A. RANDALL, a graduate of the University of Pennsylvania in 1880, has been appointed Clinical Professor of Otology in the University, to succeed Dr. Geo. Strawbridge, resigned. The choice is excellent.

BEQUEST.

By his will, the late Mr. H. J. Hunt, of Brexlow Hill, has left the sum of £200 to the Asylum for the Deaf and Dumb, Old Kent Road.

MISCELLANEOUS.

The Committee of Management of the **National Eye and Ear Infirmary of Dublin** propose to increase the accommodation at that institution, and to provide beds for sixty in-patients ; for this purpose the sum of £7,000 is required.

The annual meeting of the governors and others interested in the **Newcastle Throat and Ear Hospital** was held on January 23d. It transpired that 2,516 patients had passed through the institution.

The bill to provide for the **elementary education of the blind and deaf in England** was read a second time in the House of Lords on February 16th, and passed through committee and was reported on February 23d. A somewhat similar measure, applying to Scotland only, was passed last year, and when the English bill has passed through all its stages we hope to be able to give a *résumé* of the two together.

In connection with the **London Post-Graduate Course**, the following (among other) lectures have been delivered since the beginning of the year, viz. :

By Mr. W. R. H. Stewart, at the London Throat Hospital, "On Otorrhœa."

By Dr. Ed. Woakes, "On Tinnitus and Vertigo."

By Mr. G. Stoker, "On Chronic Glandular Disease of the Pharynx and Naso-Pharynx," and "On the More Common Forms of Disease of the Nose."

We are glad to see that the importance of Otology has thus received practical recognition in this course, though it still remains unnoticed in the prospectus.

In a recent number of the *Lancet* (February 28th), Mr. Mayo Collier records a case in which the little operation of "**Tapping the Mastoid Cells**" was resorted to rather as a matter of precaution than cure. In his own words: "I would urge that, although there be no pain or tenderness and no evidence of the retention of pus, if the discharge be obstinate, offensive, and of some years' standing, a cure may be effected and death averted by a timely vent in the mastoid process." With this advice there are, we should imagine, but few who will not agree.

The annual general meeting of the **Royal Ear Hospital of London** was held at the hospital, Frith Street, Soho, on January 20th. The report for the previous year (1890) was presented, and showed a decided increase in the number of patients that had been under treatment. One hundred and thirteen cases had been admitted as in-patients, of which no less than 95 were under the age of sixteen; the out-patients numbered 2,823. To cope with the increase in the numbers, it was thought advisable to appoint a clinical assistant, and G. S. Cheatele, Esq., F.R.C.S., was elected to that post. Considering the steady increase in the numbers from year to year, the possibility of enlarging the out-patient department was discussed. The hospital is to be congratulated upon its flourishing condition and the amount of good work it gets through.

The length of time which a **foreign body** can exist in the **external meatus** without giving rise to serious trouble, is well illustrated by a case reported in the *British Medical Journal* of February 28th, by Dr. Foxwell, of Birmingham. In this case a pea was removed, by syringing, from the meatus of a lad aged eighteen, in whom the symptoms of earache, etc., had only lasted six weeks, while an authentic history of the introduction of the pea two years and one half previously was given.

Obituary.

1. When requested by the editor of these ARCHIVES to write an obituary of the late Dr. Henry Ferrer, I thanked him for the privilege accorded me of testifying my esteem for a *confrère* who had resided and practised for many years in the same city with me. Ferrer was born at Santiago de Cuba in 1850, and died at Santa Barbara, California, October 22, 1890.

Santiago de Cuba, Bordeaux, and Heidelberg were three essential factors in framing his body and mind. Sunny France deepened the warmth and glow of his temperament, and added "grace and form to the clear-cut Spanish mould." Naturally dexterous and quick, as he ripened intomanhood, studious habits and an ideal love for the study of medicine, in Alt Heidelberg, took full possession of him. He was the right man for the city at the Golden Gate.

The Spanish, French, German, and English languages were equally at his command, and he spoke himself into the confidence of his cosmopolitan clients. His own countrymen were proud of him, the French loved him, the Germans fraternized with him, and the Anglo-Saxons fully esteemed him. But above all this was the fact that his *confrères* did not grudge him his success, for they could not but admit his skill as a diagnostician and operator, and admire his industry, his fairness, and his great desire to improve every branch of his profession. He was a competent pathologist and microscopist, and a very clever draughtsman, and in fact was the main support of the German Hospital.

He took an active part in the medical societies of San Francisco, and communicated his experience and investigations in numerous contributions to medical journals, of which the recent articles on operations on the mastoid process in the ARCHIVES OF OTOTOLOGY are of particular importance. His early death will be regretted, and his memory kept in honor both in America and Europe.

A. BARKAN.

2. At the comparatively early age of forty-nine, Edward Bellamy, F.R.C. S., etc., Senior Surgeon to Charing Cross Hospital, fell a victim to the severe weather which prevailed in London during December and January. He died of acute pneumonia on January 4, 1891. It will be within the recollection of many that he was the author of the article on "Diseases of the Nose," in Quain's Dictionary of Medicine.



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ARCHIVES OF OTOTOLOGY.

TWO CASES OF ADENOMA OF THE SEBACEOUS GLANDS OF THE EXTERNAL EAR.

By DR. C. KLINGEL, BERLIN.

Translated by Dr. WARD A. HOLDEN, New York.

(*With Plates I. and II. of vol. xxi., German Edition.*)

TWO cases of adenoma of the sebaceous glands of the external ear have recently been observed in Dr. Hartmann's aural clinic, and were examined microscopically.

CASE 1.—Mrs. P., æt. thirty-six, came to the clinic complaining of a growth in the external auditory canal. It had been noticed three months before, had never caused pain, and had not injured the hearing. The patient complained only of a feeling as if the ear were plugged with cotton.

On the anterior wall of the auditory canal quite externally, sat a tumor somewhat larger than a pea (Fig. 1, Plates I and II).

The tumor was soft to the touch, covered with epidermis having isolated small hairs, and in which the orifices of sebaceous glands could be seen with the naked eye.

It was removed at once with the galvano-cautery loop. In the course of the after-treatment it was once necessary to cauterize the base of the tumor with nitrate of silver.

The extirpated tumor was washed in water, placed then in alcohol and ether *aa* for twenty-four hours, imbedded in celloidin and cut. The sections were stained with carmine.

CASE 2.—Mr. P., æt. forty-five, came to the clinic with a tumor of the same size and appearance as that in Case 1, but located on the anterior surface of the auricle, at its inner portion, where it passes over into the posterior wall of the auditory canal. The patient was unaware of the presence of the tumor which had caused no symptoms.

This tumor was removed partly with the cautery loop, partly with the knife. The extirpated piece was hardened and cut as in the preceding case.

Both tumors were of equal size. Each was about as large as a pea, soft and sponge-like to the touch, the surface slightly roughened, and showing a few scattered hairs.

Microscopically the structure was similar in the two, and the description which follows refers, for the most part, to the tumor of Case 1, since that of Case 2 could be removed only in pieces.

The ground substance of the tumor is a delicate loose connective-tissue. The intercellular substance shows fine shining fibres running in parallel tracts with a slightly wavy course, the tracts interlacing in various directions. Among these fibres lie the connective-tissue cells, in places isolated, at other points grouped. The cells are mostly spindle-shaped, the protoplasm scarcely visible, the nucleus stained darkly. The nuclei are relatively large, and for the most part contain several nucleoli imbedded in a finely granular substance. Between the tracts of fibres are isolated cavities, which, however, are not lined by endothelium.

The vessels are few and mostly small, and rarely show a wall consisting of many layers of cells. Usually there is merely an endothelial sheath, the cells of which are here and there in process of proliferation, causing the wall to appear thicker. This proliferation, however, never reaches such a stage that the lumen of the vessel becomes occluded. The proliferated cells seem often to have undergone a hyaline degeneration, so that the contents of the vessel consist of a clear vitreous mass, in which nuclei can still be perceived with difficulty—relations such as are pictured in Figs. 3 and 4.

Toward the periphery of the tumor the connective-tissue cells lie crowded together in close groups (Fig. 5). The cells themselves are rounder and larger, and have large nuclei which stain well with carmine and contain several nucleoli. Traces of karyokinetic figures are occasionally seen. Between these groups of cells just described run narrow connective-tissue tracts with parallel fibres, containing fine spindle cells and isolated small vessels. The cell-groups, most marked in the periphery of the tumor, grow smaller and further apart, and the cells fewer toward the

central portion, where the connective-tissue predominates. I hold these groups of cells to be evidences of growth which here, as in other structures, is localized to the periphery of the tumor.

The external covering of the tumor consists of a thin layer of epidermis. The lower layer is formed of cylindrical cells, above this the cells are rounder, and nearer the surface is a layer of flattened cells covered with a delicate horny layer; the epithelium is otherwise not remarkable.

The hairs spring from follicles sunk deep in the tissue, which contain great masses of epithelial cells, separated from the neighboring cellular tissue by a fine layer of connective-tissue with parallel fibres. The latter undoubtedly corresponds to the usual fibrous sheath of the hair follicle. Muscular fibres, which might be *arrectores pili*, were not found.

Near the hair follicles, sebaceous glands were found which excite interest on account of their excessive development. These are partly in connection with the hair follicles, partly distinct from them. In one section (Fig. 2) which passed through the middle of the tumor, perhaps not quite parallel to the surface, large glands are seen deep in the tissue in such large groups that it can well be considered a new formation. The individual glands are composed of several lobules. The new formed glandular tissue has the character of normal sebaceous glands, being only more excessively developed.

Each lobe of a gland is surrounded with a connective-tissue sheath, which is continued about the smaller lobules also. This connective-tissue layer lies for the most part adherent to the proper gland tissue, but here and there cavities exist between them. The glandular substance consists of large epithelial cells, the exterior ones well preserved, staining with carmine, and having a sharply contoured nucleus with a number of nucleoli. The layer of normal cells is, however, very thin, and further inward the aspect of the cells changes. They appear larger as if swollen, do not stain so clearly, and the contours as well as the nuclei are less sharply defined. The interior portion appears often as

if it had undergone fatty degeneration, and is changed into a structureless mass. The same processes take place here as in normal sebaceous glands, in that the interior epithelial cells, which are cast off, swell, undergo fatty degeneration, and form a detritus which is excreted as sebaceous matter on the skin.

Convolutcd glands, such as might have been expected from the location of the growth in the external canal, were not found.

To recapitulate, the sections showed *connective-tissue tumors covered with epidermis, in which there is seen a marked new formation of glandular elements, similar in character to normal glands.*

As far as I know, Gruber is the only one that has described such formations, and he classes them with the papillomata (Text-book of Otology, Vienna, 1888). He also describes the "markedly hypertrophie or even cystic follicle, whose contents are found at times to be chalky"; and he has repeatedly observed the transformation of these papillomata into epithelial carcinomata.

In my opinion, these tumors which I have described should not be classed as papillomata, although the warty exterior, and the fact that they arise from the subepithelial connective-tissue of the skin of the auricle would suggest this view. We have, however, not only a warty hypertrophy of the papillæ, but also a marked new formation of glandular elements. I would, therefore, call these structures adenomata of the sebaceous glands (adenoma sebaceum), and since connective tissue is not an unimportant element of the tumors, adenoma sebaceum fibrosum.

Explanation of the Figures.

Fig. 1. A drawing of the tumor in Case 1, as it first presented itself.

Fig. 2. Section through the middle of the tumor (slightly magnified).

Figs. 3 and 4. The proliferations of the vascular endothelium which have undergone hyaline degeneration.

Fig. 5. Cell-groups in the periphery of the tumor.

Fig. 6. Hypertrophie sebaceous glands.

VESICLES IN THE EXTERNAL AUDITORY MEATUS.¹

By H. L. SWAIN, M.D.,

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IT will be generally conceded that the occurrence of vesicles in the external ear and upon the membrana tympani is rare. They present themselves in two varieties; the one with clear, colorless serum, the other where the contents are more or less distinctly red—*i.e.*, bloody, both kinds occurring in the same case in some instances. To the latter variety a specific name is sometimes given and a few writers have considered it as a special disease, terming it Otitis externa hæmorrhagica. Under this title Gorham Bacon² writes that in 2,500 cases of ear disease he met this disease only five times. He quotes quite at length from the very little literature which is available on the subject and his conclusions from his own experience tally very closely with those of the authors quoted.

Anything as rare as the above in so large a clinical experience is always a matter of interest, and as my own observations did not discover but three cases of vesicles in almost as many patients (some 2,000 cases) seen up to December, 1889, I may be excused if I place at this time on record the short report of the five following cases which occurred during and subsequent to the pandemic of the grippe, 1889-1890, and all appeared within a few months in my own private practice. I am aware that my experience

¹ Read before the New Haven Medical Club.

² Otitis externa hæmorrhagica.—Archives of Otolaryngology, vol. xix., No. I.

has been duplicated by that of a number of other observers as recorded in several foreign journals, and intend this simple statement to be as a mite added to the more extensive records of others, the last case being of interest in its uniqueness. The only conclusion that is drawn is that which is self-evident, namely, that the grippe was responsible for this sudden appearance of so many cases in so short a time. A second thought which suggests itself is, whether there is not the same pathological condition necessary to the production of all the vesicles as existed in the case of the one occurring in connection with herpes and of those produced in the last case as part of that pathological curiosity, pemphigus.

Of the three cases which I saw previous to December, 1889, two were seen in Germany and were the only cases appearing in the clinics during the two years. The one appeared in the Policlinic, and the other in the private practice of Prof. Hagen in Leipzig. The third case came in my own practice one month previous to the appearance of the Grippe in New Haven. The first case appeared in the left ear of a boy of seven or eight years who was under treatment for chronic middle ear catarrh. It came in curious connection with a herpes at the angle of the mouth on the same side and a slight phlyctenular spot on left sclero-corneal margin of left eye, was simple serous in character, occupying the post. infer. quadrant of the drum, caused some pain, not a little deafness, both the latter being relieved by puncture, and got well in a few days with the throwing off of a large flake of epithelium from the drum. The second occurred at about the same time as the other and appeared in a young lady of about twenty summers, who was also under treatment for middle ear trouble. It was also upon the drum, and disappeared in a few days, having been of the colorless variety and causing no very intense symptoms. The third was some three or four years later—November, 1889. The young lady, twenty-one years old, came with a discharging right ear, which trouble had appeared after an earache of some thirty-six hours duration. The discharge was principally serum, and when wiped out disclosed a vesicle, covering

both posterior quadrants of the drum. The color was light red and on being punctured a drop of clear serum came out with a complete collapse of the vesicle. Politzer's experiment showed that no perforation of drum existed. Before puncture, Hearing Dist. for watch (normally heard at ten ft.) was fifteen inches : after puncture, eighteen inches. The case showed no discharge on re-appearing on the third day and the hearing steadily increased to normal, although during the following two weeks the drum was very concave. The middle ear was open to Valsalva's experiment during whole duration of the treatment, which was about a month.

The first of the five cases forming the subject of present report presented itself on the seventh of January, 1890.

The history is as follows :—Mr. P., age twenty-one, student at University, was attacked with the grippe eight days ago, which pursued a rather violent course, judging from fever and prostration suffered. Night before last was attacked with violent pain in right ear which, continuing almost steadily, was only slightly relieved by the appearance of discharge at ten last evening. The matter discharged was watery in appearance, having a slightly red tinge, and continues until present, filling the ear. The left ear was not painful although patient thought he heard less than usual. The drum on that side was thickened, concave and had a yellowish red cast. H D, R ear, three in. ; L ear, sixteen ins. After wiping out the discharge in right ear, there was disclosed a hemorrhagic vesicle occupying the whole posterior part of drum, enough swelling of the superior part of drum having taken place to obscure proc. brevis of the malleus. The anterior half of drum was very much bulged and from a small perforation, invisible at this time, some serous matter oozed on Politzer's experiment being performed. A partial evacuation of vesicle was obtained, and patient was put upon usual treatment for acute otitis media, nothing but hot water being instilled into the ear. The next day a new vesicle had appeared, covering post. sup. quadrant and the membrana flaccida. This was punctured and only partially evacuated itself as was the case yesterday. H D, four in., R ear. Discharge thick and abundant, red in character. No pain. The same status was presented on the following day, with same result of puncture. On the fourth day a deep incision more anteriorly

than before into the vesicle was followed by a profuse discharge of blood for some ten minutes, and on its ceasing Politzer brought air through the membrana flaccida. After this the discharge in the ear grew rapidly less, and on the 21st the openings superiorly in membrana flaccida and in the anterior sup. quadrant had both closed. H D, R ear, six inches. No re-puncture of the drum was necessary and although the patient remained under observation until the 25th of April his H D for R ear was only twenty-three ins., and the L ear, twenty-eight in. The left drum was so much thickened by previous disease that one could not be expected to produce any improvement in hearing by further treatment.

In this case we evidently had to do with extravasation of blood into the attic of the tympanum as well as the occurrence of a bloody vesicle, and that explains our ineffectual attempts to get complete removal of the blood by puncture on the second and third day. The treatment included syringing, astringent drops, applications to naso-pharynx, which had been violently congested, the latter being not a little helped by frequent gargles with ejection through nostril.

CASE 2.—Mrs. P., widow, thirty-seven years, resident in city. Eight days ago attacked by the grippe. Three days ago pain and deafness in the right ear, culminating in breaking with discharge thirty-six hours ago. The matter flowed abundantly and patient reports that blowing the nose was followed by bubbling and much pain in the ear. Still pain and deafness were unrelieved. The left ear has been deaf since childhood, following scarlatina. Case presented itself January 24th.

STATUS PRÆSENS.—Right ear full of discharge, muco-purulent. Left ear clear, drum very much thickened, very concave, well-nigh rigid, presents chalk deposits in both ant. and post. halves. H D, watch. R-ear-contact; L not at all. On wiping out discharge in right ear we found a very red drum with a goodly opening in ant. inf. quad. Posteriorly a large hemorrhagic vesicle covering all the posterior half of drum and running slightly on to the adjacent wall of meatus. So very thin was the epithelial covering that the next move of the cotton-wad to dry it more thoroughly resulted in its complete collapse and the discharge of its bloody contents. Politzer's ex. revealed post. quadrant intact, and easily blew out discharge from middle ear. Hot water was ordered internally and externally. Spray of Seiler's

tablets for severe rhinitis, as also insufflation of boric acid, cathartic. The next day found patient with abundant discharge, no pain, perforation freely open, no new vesicles. H D, *id.* Two days later the watch could be heard, open, at $2\frac{1}{4}$ in. The opening in drum healed kindly by the 3d of February following, syringing with simple antiseptic wash, and the rhinitis had almost disappeared. The hearing, however, was very obstinate, and patient presented herself for treatment very irregularly. On the 22d inst. H D R, 12 in. watch closed. Was but little better for some two months, according to patient's own statement, I not having examined ear later.

CASE 3.—Miss C., twenty-seven years. Teaching in the city Resident in a suburb. Has always had excellent hearing and had formerly been under my treatment for catarrh of the nose and throat. Two days ago severe cold with some prostration, which the patient objects to terming the grippe. The left ear soon began paining her, and this continued until last night, when something broke and almost clear blood came; later watery matter. Pain is better to-day, but patient is "some deaf" on that side. Case presented itself February 17th.

STATUS PRÆSENS.—R drum normal. L ear with a very little watery fluid which is a probable residue from syringing with hot water early this A.M. Drying this reveals a not very congested drum, which is somewhat opaque, position good, *proc. brevis* visible, and on its posterior edge, exactly on the border, two small bloody vesicles, perhaps more on the wall of the meatus than on the drum, were apparent. As the patient strongly objected to puncture, and in fact fainted after Politzer, concluded to let them alone, especially as there was only a very indefinite bubbling and no appearance of serum in middle ear. The drum moved on Valsalva's experiment and patient was directed to repeat this frequently after gargling and spraying nostrils. Only warm water was instilled into ear. H D R ear 7 feet; L ear, 26 in.; after Politzer 50 in. The next day patient reported more deafness, no pain, and some bubbling on inflating ear. The drum was somewhat reddened and slightly convex. The vesicles had broken during night, but patient reports only slight bloody discharge. H. D. R ear, 10 in.; after treatment, twenty in. Desired patient to submit to puncture of drum, but could not succeed in overcoming aversion until on the second subsequent day when it was done, as there was a great decrease

in the hearing distance, as also considerable pain. The puncture was followed by mucus and serum, and the H D was improved from 6 in. to 10 in. No re-puncture was later necessary, the H D steadily improved and the patient discharged when the latter had reached 48 in., as it did on the 14th of March. By the 6th of June the hearing distance had not improved. No subsequent test.

The next case came at a considerable interval later, consulted me in July for the first time, reporting chronic discharge from ears which had existed for ten years at various intervals. A late attack of the grippe had been very slowly recovered from and was followed by a relapse from which she thinks herself not to have fully recovered. Her ears in any case have been very much worse.

CASE 4.—Mrs. A., thirty-one years, comes with discharge of blood from right ear during the last few days ; left ear very much stopped. No pain or especially acute symptoms. STATUS PRÆSENS.—Right ear full of pus. L ear cerumen and detritus from an old purulent process. Removal of pus in right ear disclosed a drum wanting as to its posterior half, very much thickened and slightly reddened. In the middle ear posteriorly abundant granulations. Cleansing of the left ear showed exactly similar status save that all was quiescent, there being no discharge. Patient was put upon a disinfectant wash for right ear, and the granulation thoroughly cauterized with chromic acid. Some little reaction followed but was easily subdued and case progressed nicely. The H D at this time was about the same for both ears, eight in.

In the latter part of the month patient came complaining of increased deafness and slight pain in left ear. Examination showed slight redness, not enough to make an especial change in treatment except as regards nose and throat. The next day patient had intense earache and deafness on the left side with toward night some bloody discharge and no relief to suffering. On arriving at house at midnight found the ear full of yellowish-red discharge, and on removal of this, three hemorrhagic vesicles. One occupied all the surface of old perforation and covered part of membrana flaccida, another was limited to anter. inf. quadrant of drum, while the third, which seemed collapsed, was very small and occupied the upper part of ant. sup. quadrant. All three were punctured, and considerable dark-red fluid evacuated, but no more than one might suppose the vesi-

cles themselves to contain. Politzer's experiment, while very painful, produced no addition to the fluid in the ear. None of the vesicles entirely emptied themselves. With only a dose of sulphonal patient slept well that night and was much easier the next day. The vesicles still contained blood, and ear discharged reddish serum. I was called out of town next day and did not see patient for three weeks. At the latter date the ear was discharging pus and showed many granulations, the old purulent otitis media having been lighted up. The subsequent history was uneventful, except that the recovery was very slow. By October 27th all discharge had ceased in both ears. H D 10 inches, right. Left, 12 inches.

CASE 5,—although early in date—May 18th—I have left to the last. Previous history showed that he had as a young child some earache, never any discharge for any length of time, with the appearance of a "blister" on external ear on one occasion. Had not had regulation grippe, but during last two weeks had been gradually developing a general malaise, for which he had been kept from school for the last week. Yesterday the left external ear developed a peculiar large "blister" upon the edge of pinna and became painful as in an ordinary earache. At the same time the whole external ear began to swell, grow red, and stand out from the head. Last night great pain and some deafness with considerable constitutional depression.

STATUS PRÆSENS.—Well-nourished boy, fifteen years old, considerably flushed in appearance, with left ear standing far out from head, the same red, tender, and with two bullæ on the posterior edge of pinna. The mastoid region was very tender on pressure and swollen. The meatus was filled with serum of a similar character to that which came from the breaking of the bullæ on the pinna. It stiffened linen slightly on drying. Within the meatus was what appeared to be a vesicle over drum completely masking the picture; contents bloody in color. Temperature taken in the mouth, 104.4°. Pulse 130, rather weak. Syringing ear had no effect on the vesicle. Punctured it, however, with its complete collapse following. An attempt was made to puncture drum, as the fever and swelling in mastoid seemed to point in that direction, and the complication of mastoiditis was at least imminent. In attending to ear the bullæ on the pinna had rather been forgotten. The drum was not reached, at least Politzer failed to make any addition to fluid

or produce bubbles. Four leaches were set at 6.30 P.M.; foot-bath, cathartic, ice to mastoid region, and antipyretic ordered. Early the next morning the patient was seen and the swelling had begun decidedly to leave the posterior aspect of ear and to wander into temporal region, whither also the redness and quite a crop of vesicles ten or twelve in number grouped into a place as large as a silver dollar, radiating somewhat as the *pes anserinus* of the seventh nerve. Temperature 103.6° F. Syringed ear, finding it impossible to get at drum, concluded to wait, as the mastoid on deep pressure was not tender. Whiskey was ordered and frequently administered, as patient was much prostrated. From now on I deemed the ear one of pemphigus. At 5 P.M., temperature 104°; pulse, 120. No earache, and very little headache. Left eye is beginning to be painful, and the lids are beginning to swell. By careful drying was enabled to reach left ear drum and punctured the same, with considerable serum following both Politzer and Valsalva. The vesicles had all disappeared from the immediate neighborhood of ear, leaving a dry encrustation which resembled a thin layer of mucilage, where it dries on the finger. The whiskey was supplemented with iron, and antipyretic was repeated. Next morning, temperature 102.4°. Pulse, 115. Evening, 103.2°. Pulse, 120. Ear discharging mucus and serum. The crop of vesicles was all over under lid of left eye in the morning, while both lids were intensely swollen and reddened. They could not be opened, except by much traction, but eyeball was unaffected. By night the vesicles were on the bridge of nose and down on the ala of left side. Ten grains of quinine was the evening dose of antipyretic. The following day began as the previous: Temperature, 102.4°. Pulse, 104. Evening temperature, 103.8°. Pulse, 125. I had supposed that the median line would not be invaded by the vesicles, but was doomed to disappointment, for in the morning they were already on right side of nose and on the lids of right eye, which reacted almost as much as the left. As fast as the vesicles progressed, the old ones burst or dried up, and so the area covered by good, discrete vesicles was about the same in extent from the second day on. The fifth day was ushered in by a temperature of 98°. Pulse, 95, and quite strong. The evening temperature was 102°. Pulse, 105. During the day the vesicles had wandered across the face, and by evening the vanguard were in the temporal region bound for the ear, which latter, however, they never reached; for on the

next morning with a temperature of 98°, pulse 92, no new ones had formed in this direction, and the only addition was found in the supra-orbital region. The quinine was reduced that evening, and temperature did not get above 100°. The next day the temperature was normal all day, no new vesicles formed, and the swelling began to leave the face. In a few days everything was fully recovered but the ear, which discharged until the 16th, and the patient slowly, but without any relapse, gained strength.

I have deemed this case one of acute pemphigus, for the existence of the other vesicle-producing diseases was negatived by the history. It was not *herpes zoster*, because the traditional forms of this trouble do not possess bullæ, nor do they pass over the median line and steadily progress upon the other side of the body. Erysipelas and erythema bullosum would have produced more intense redness than existed at any period of the attack, and the general swelling was not great enough for either of these, as I have seen them. To the evidence stated is that further added by the appearance of the patient to-day with the history of having had what the family termed the "grip" for a few days. Yesterday earache came on and with it a bulla on upper edge of auricle. On examination of ear a sub-epithelial hemorrhage was found on the drum in posterior half. No cold in the head had preceded, and yet the drum was drawn in and H D much reduced. Temp. 99.3°. The symptoms had all lessened the next day, and by three days had disappeared. The H D was not quite up to previous condition.

ADDENDUM.—Since the preparation of this paper was begun and in company with the appearance of undoubted cases of the grippe in New Haven, two cases of hemorrhagic vesicles in the external ear have been added to those already chronicled at length, and in the practice of a colleague in this city another has appeared. In my own cases the history thus far has been the same as in the cases mentioned. The patients were both about twenty-two years of age, one male and the other female, the former being affected on the right side, the latter on the left. Both suffered the most excruciating pain that it has ever been my lot to witness, and the former had a repetition of his

agony twice after the beginning, the formation of a new vesicle being the apparent cause each time. This seems to be frequently the case, that the pain in these cases is more intense than in the ordinary otitis media acuta. The second case had an immense gush of serum following the puncture of the drumhead, the fluid flowing out of the ear in a perfect stream immediately upon the puncture, and not ceasing at all for a half hour. No efforts at Politzer or Valsalva seemed to avail to so free the middle ear that the flow stopped for even a moment. This latter case had but two vesicles, the one away from the drum in the canal and the other on the posterior superior quadrant of the drum. The young man had in all four vesicles, and all were on the posterior half of drumhead, one overlapping on the adjacent wall of the canal. The cases are progressing as in the cases detailed.

THE USE OF ELECTRICITY IN CHRONIC AFFECTIONS OF THE MIDDLE EAR, WITH A REPORT OF THE FIRST TEN CASES SO TREATED.

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IT is my wish in this paper to present to your notice some of the benefits obtainable from the use of the *constant current of electricity*, in the more obstinate forms of middle-ear disease of the catarrhal or proliferous variety.

The subject does not seem a very promising one. Aural surgeons as a general thing do not place much dependence on its use. Beard and Rockwell, in their work on Medical and Surgical Electricity, open their chapter on diseases of the ear with the following statement: "The diseases of the ear are less amenable to treatment by electricity than analogous diseases in most other parts of the body. Hence it is that there is no branch of electro-therapeutics where there has been such general disappointment, both among aurists and electro-therapeutists, as in diseases of the ear"; nevertheless, after having used this remedy for some time, and finding that in quite a large percentage of the cases on which it has been used, namely, cases that have not derived the expected benefit from the regular methods of treatment, that the results have been immediate, marked, and lasting, I still continue the use of this remedy in suitable cases.

My attention was called to the use of electricity in aural troubles by the remark made by a patient on whom I had

been using the galvanic current for exophthalmic goitre ; for after having continued the treatment for three or four weeks by currents of from ten to twenty-five milliamperes, applied to the *cervical sympathetic*, as well as to the parts involved, the patient volunteered the remark "that since the electricity has been used, I have been freed from a buzzing, ringing noise in my ears that has troubled me for a year and a half, and that has been much worse whenever I took a cold." This corroborates the statement made by Politzer, "That electricity can be useful in ear troubles applied through the sympathetic," on the grounds that the beneficial results are obtained through reflex action, a statement that he admits is contested by Erb.

In treating diseases of the ear, it is the misfortune of most practitioners to meet with a various percentage of cases of middle ear disease that do not improve as fast or as much as one would be led to expect from the objective and subjective symptoms of the case ; many of these same cases complain of the subjective noises, and feel that they would be well enough could this one symptom be removed or lessened. It is in this class of cases exclusively that I have used electricity, never using it until the patient has been under my charge from two to four weeks, and only then using it, if after having made use of inflation, catheterization, aural tampons, etc., and after having attended to the pharynx, naso-pharynx, and nasal cavities, no marked improvement has been found.

The benefit derived from this method of treatment is usually noticed by the patient after the second or third application, and the improvement is so much more marked in these cases that are to be helped than that derived from the regular treatment before used, that patients frequently volunteer statements relative to the help derived from the electrical treatment.

I have not been able to diagnose the cases that would be helped by this agent, and while many of these difficult cases are cases of proliferous disease of the middle ear, I am not prepared to state that the proliferous variety of middle ear disease is the only kind that is helped by elec-

tricity. Chronic middle ear disease, especially of the profliferous variety, is often complicated with disease of the internal ear; but cases showing any tendency in that direction, as shown by Rinne's tuning-fork test, by the power to hear better in quiet, by the relative power of hearing speech better than the watch, or by the diminution of hearing after inflations of the middle ear, have been excluded from the cases considered here.

When improvement takes place, it is most noticeable in the increased ability to understand speech; the tinitus is lessened; those feelings of pressure, of fullness, and of dullness are lessened or removed; the parts feel as if there was more life in them. In fact, in these cases the condition of things that patients so often wish for—namely, that if the subjective noises might be lessened that they could hear well enough—seems nearly attained.

The method of application that I use is simple. After placing the patient with the head inclined, the external auditory canal is filled with warm water, the aural electrode, a small wire insulated to within 2 *mm* of its point, is introduced into the auditory canal, and retained there by the fingers of one hand, leaving the other hand free to manipulate the switch, rheostat, and pole changer; the other electrode, one covered with a sponge, is held in the hand by the patient. The current is then switched on and gradually increased, watching the milliampèremeter, until from five to ten milliampères of current are passing through the parts, then, retaining the electrodes in position, the poles are changed two or three times a minute. From three to six minutes is long enough for the applications to last. The ear is then dried, the patient kept quiet for a short time, to recover from the dizziness that is often produced. I repeat the applications daily or every other day for a period of one to three weeks. The milliampèremeter should always be used to measure the dosage of electricity, notwithstanding the statement made by Politzer "that the rheostat and galvanometer, indispensable for physiological experiments, are superfluous for therapeutic purposes," for only by the indications of this instrument has the practitioner means of

knowing the amount of electricity passing through the parts, for the resistance of the parts are different in different patients, and also is modified by disease.

I have not found it of any use to continue the electrical treatment if improvement is not noticed by the patient after the third application, so not much time has been wasted if help is not received.

The following are the first ten cases so treated, and have been under observation for six months from the date of treatment. They show a larger percentage of success than those treated since then, but the results on the whole are so satisfactory by bringing help to cases not otherwise relieved, that I am satisfied to continue the use of electricity in obstinate aural troubles.

It must be remembered that these ten cases were selected from the patients who showed no improvement after careful treatment of from three to six weeks; and remembering this fact, two cases of marked improvement in ten cases is a large enough percentage to warrant a further trial of electricity.

CASE 1.—Mr. G. H D R $\frac{1}{8}$, H D L $\frac{1}{8}$. After three weeks of regular treatment hearing improved to $\frac{1}{4}$ right, and $\frac{1}{4}$ left. Then used a *galvanic current* of from 5-10 milliampères. The patient noticed great improvement in the subjective symptoms after second application. After five applications of electricity hearing improved to $\frac{1}{2}$ right, and $\frac{1}{2}$ left, and especial improvement in the feelings of dullness and of pressure.

CASE 2.—Mrs. J. H D R $\frac{1}{8}$, H D L $\frac{1}{8}$. After four weeks of treatment by inflation and by the use of the catheter hearing improved to $\frac{1}{4}$ right. *Galvanic current* of from 5-12 milliampères applied three times with no improvement, so discontinued its use.

CASE 3.—Miss F. H D R $\frac{1}{8}$, H D L $\frac{1}{8}$. After six weeks of treatment by the usual methods only slight improvement noticed. *Galvanic current* gave improvement.

CASE 4.—Mr. K. H D R $\frac{1}{8}$, H D L $\frac{1}{8}$. No improvement from the use of catheter, aural tampons, or inflation. *Galvanic current* gave no help.

CASE 5.—Mr. L. H D R $\frac{1}{8}$, H D L $\frac{1}{8}$. After three weeks of treatment by inflation and by treating a naso-pharyngeal catarrh

hearing was improved to $\frac{1}{4}$ right, and $\frac{1}{4}$ left. *Galvanic current* of 10-12 milliamperes used eight times—subjective noises greatly diminished, ears feel clearer, hearing improved to $\frac{1}{4}$ in both ears.

CASE 6.—Mr. S. H D R $\frac{1}{4}$, H D L $\frac{1}{4}$. Three weeks of treatment directed to the middle ear and pharynx made no improvement; no improvement from *galvanic current*.

CASE 7.—Mr. W. H D R $\frac{1}{4}$, H D L $\frac{1}{4}$. After three weeks of regular aural treatment hearing improved to $\frac{1}{4}$ right, and $\frac{1}{4}$ left. One application of the *galvanic current* caused intense pain in the ear that lasted for three hours; pain then gradually passed away and no further trouble noticed. Electricity was not used again.

CASE 8.—Mr. R. H D R $\frac{1}{4}$, H D L $\frac{1}{4}$. No improvement in the hearing after using the catheter and air-bag for four weeks. After using *galvanic current* twice patient thinks that he cannot hear as well.

CASE 9.—Mrs. K. H D R $\frac{1}{4}$, H D L $\frac{1}{4}$. Sprayed the throat, inflated, catheterized Eustachian tubes, and ordered aural tampons, with no improvement. *Galvanic current*, applied three times, gave no help.

CASE 10.—Mr. H. H D R $\frac{1}{4}$, H D L $\frac{1}{4}$. After three weeks of inflation, catheterization, and aural tampons no improvement in hearing. *Galvanic current* of 10 milliamperes applied three times gave no help.

ON THE USE OF BENZOINOL FOR MOISTENING THE COTTON ARTIFICIAL MEMBRANA TYMPANI.

BY DR. JAMES A. SPALDING, PORTLAND, ME.

FOLLOWING the usual habit of most aurists, I have for many years tested with the cotton artificial membrana tympani, for a possible increase of hearing, almost every case of old perforation of the *Mt.*, with or without persistent otorrhœa. I have also used the rubber artificial membrane, as well as bits of paper, but generally the cotton dipped in glycerine, pure, or diluted with water, has produced the most satisfactory results; yet I can recall one patient in whom the use of the rubber membrane was very remarkable, though occasionally producing a discharge. The principal secret of the cotton "membrane," if it can actually be called by that name, lies in placing it precisely in the perforation, so as to bridge over the orifice. For this reason it is important to urge the patient to learn to insert it personally, for he can better tell when it is in position than the surgeon, who may have to ask question after question before he places it correctly. The second necessity is to have it small enough to pass freely to the end of the canal, yet large enough to cover the perforation entirely without wedging it too hard against the end of the passage or the remnants of the *Mt.* A third necessity is to have it moist enough, at first, so that it can remain *in situ* for a reasonable length of time, in order not to demand frequent

changing, whilst finally it should not be dry or irritating enough to excite discharge.

The shape does not seem to have any especial effect on the amount of hearing, for some patients hear best with a flattish disc of cotton, and others with a thin long piece which may even extend out of the meatus.

Having once determined in any given case that the hearing can be increased by the cotton, we should show the patients how to use it, for they cannot come every time to have it put in position, and they can be better judges than the aural surgeon whether the cotton has become so dry as to be irritating to the parts with which it comes in contact. Occasionally, too, it dries and falls out and requires replacement. For all these reasons it is safe and best to trust the patient with the management, as often the hearing once regained is in process of time lost by the drying or dislocation of the cotton.

All of these points and many others have repeatedly been detailed in these ARCHIVES, so that I need not go over them again. But my chief purpose in the reopening of the subject is to call attention to the use of benzoinol (which I take to be a purified benzoated oil of vaseline or liquid vaseline) for moistening the bit of absorbent cotton whenever the latter is found to be at all useful in cases of perforation of the *Mt.* The advantages that I have noticed from its use in comparison with glycerine, pure or diluted, are that it gives better hearing, and that it does not dry so soon, in other words, does not have to be changed so often. Nor is it so irritating as is occasionally observed after the use of glycerine. The few cases in which I have lately had an opportunity to use benzoinol on cotton have invariably shown that the same patient will hear *better, and for a longer period without a change of the cotton when dipped in this liquid than in glycerine.* One patient thus tested could hear twice as far with the benzoinol-soaked cotton as with that soaked in glycerine. Another could hear almost as much again. In all my cases the hearing was decidedly clearer with benzoinol than with the glycerine. I am sorry that I cannot state positively just how many patients I have

in whom the cotton pellet soaked in benzoinol increased the hearing noticeably over that obtainable with the same soaked in glycerine, but I am quite sure that the number is considerable enough for me to offer these hints to my *confrères* in the hope that they may obtain in these very undesirable cases as good results as I have so far been enabled to obtain.

One or two patients have complained of a disagreeable coolness produced by the cotton pellet thus treated, but it is the same with the glycerine application, and can easily be avoided by gently heating before using.

**SOME REMARKS ON THE USE OF STYRONE IN
CHRONIC SUPPURATION OF THE MIDDLE EAR,
ESPECIALLY IN PERFORATION OF SHRAPNELL'S
MEMBRANE.**

By DR. JAMES A. SPALDING, PORTLAND, ME.

STYRONE is a compound of styrax and balsam of Peru, which was mentioned in the therapeutical journals some time ago as a very efficient antiseptic remedy; but owing to the great expense attendant upon its composition it did not come into general use. Lately, however, it has become comparatively cheap, and is sure to make a name for itself in general as well as special surgery. My attention was first called to the use of styrone in aural practice, by a paper of Chelstoff's, and I at once began to use it in any obstinate otorrhœas that came under my care. This remedy has to me a very pleasant odor, and one that most effectually masks that of the most disagreeable discharges from the ear. For this reason only, even if styrone possessed no other valuable properties, it would be far in advance of iodoform and other antiseptics, many of which mostly substitute one bad odor for another. The new remedy can be used largely diluted with alcohol (1 per-cent. to 5 per-cent.) to syringe out the meatus, or it can be dropped in the same strength into the meatus, after this has been thoroughly cleansed with water. Chelstoff made some interesting experiments to decide if it were not the alcohol which diminished the discharge in cases where the alcoholic dilution of styrone had been employed; and was able to

prove, without a doubt, that the styrone (with the alcohol) was successful where the alcohol had been used alone in vain. I would not, however, call attention so much to the use of styrone in ordinary cases of otorrhœa, in which it is very efficacious, as in those obstinate cases of perforation of Shrapnell's membrane, with more or less abundant serous and disagreeable discharge. In these, all sorts of antiseptics and astringents had been essayed, without much if any benefit, and the patients were averse to any attempt at an operation, for the ordinary use of the syringe in the meatus or introduction of the tympanic syringe through the perforation was so often followed with vertigo and nausea that an operation without ether was out of the question, and even with it the patients' courage failed. I showed the patients how to pass a minute cotton-tipped probe into the perforation lying high up in the end of the meatus, and then they used the alcoholic solution of the styrone, lying down, or even passing a pillow under the neck so as to elevate the head and permit the liquid to flow into the perforation. It ought to be done twice daily at the start, whilst later, once a day is enough. If the patients are not sensitive to the use of the tympanic syringe, the styrone can in that manner be much more efficiently used than by merely letting it enter the meatus by gravity alone.

The few cases of perforation of Shrapnell's membrane in which I have used styrone have shown that it is a very useful remedy in reducing the amount of the discharge and overcoming its disagreeable odor, even if it did not entirely cure the obstinate disease. Out of three recent cases, long enough under observation to prove the value or uselessness of the new remedy, two were absolutely cured in six weeks, and the third showed a very considerable diminution in the amount and the odor of the suppuration. Others still under care are progressing favorably, though as yet undecided.

I generally use the weak alcoholic solution, diluted with water, and heat it gently over a flame. After a few applications, I direct it to be used in the full strength of the solution (about 2 per-cent. to 5 per-cent.). In my opinion it is well worthy of a trial in any obstinate case of otorrhœa,

whilst future observation will decide the precise strength which is the most valuable.

I employed it in a single case of aural polypus, but it did not seem to act any better than alcohol alone. In conclusion, I would say that in every case I have used the liquid styrone, as distinguished from the crystal, though both possess the same antiseptic and deodorizing properties.

FOREIGN BODY REMAINING WEDGED IN THE
EXTERNAL AUDITORY MEATUS TWENTY-FOUR
YEARS WITHOUT INJURING THE HEARING. RE-
MOVAL WITH A HOOK AND SYRINGE.

By DR. JAMES A. SPALDING, PORTLAND, ME.

THERE is nothing particularly interesting about this case except the extreme length of time which the foreign body remained in the meatus without doing any harm. For this reason it seems to me that the case should go on record as the one of the longest continuance of a foreign body in the meatus.

A. M. P., aged 28, called to see me one day for the removal of a foreign body which had been in his right ear for 26 years. He knew that it was a bit of hickory-nut shell ; but he was very much afraid that any attempt at removal would injure the drum-head, which had so far remained intact, as well as he could judge from the fact that there had never been any discharge from the meatus, and that the hearing was intact. Examination revealed a large mass of cerumen in the meatus, and on syringing it away with the syringe, a foreign body was plainly seen wedged in across the lower end of the meatus. As repeated efforts with the syringe failed to dislodge the intruder, I passed a small hook in behind it, and with gentle force pulled it from its long resting place. The *Mt* was then seen to be intact. After removing the rest of the cerumen from the foreign body it was found to be the old bit of nut shell which, according to family tradition, the patient had, at the age of two years, pushed into his ear.

Careful tests of the hearing proved that the faculty in this ear was as perfect as in the other.

A CONTRIBUTION TO THE MORPHOLOGY OF THE HUMAN AURICLE.

BY PROF. GRADENIGO, OF TURIN, ITALY.

Translated by Dr. J. A. SPALDING, Portland, Me.

EMBRYOLOGICAL and anatomical investigations have shown that the human auricle originated by reduction from the highly developed auricle of certain classes of mammalia. We find in those mammalia in which the auricle is highly developed, adapted for the reception of waves of sound, and moved by peculiar muscles, that the cartilaginous plate of which it is most largely composed, is interspersed with striæ or concretions, which greatly resemble the veining in leaves of plants, and may serve to add rigidity to the cartilaginous plates themselves.

These striæ can be divided into two main systems as I have elsewhere shown,¹ first into those which run longitudinally, *i. e.*, from the tip to the base of the auricle, perpendicular to its insertion (longitudinal stripes), and second those which run parallel to the base, are arranged concentrically, and which I have called by the name of antihelices because they bear a great resemblance to the striæ which in the human anatomy go by the name of the antihelix. These striæ in animals often interlace with those of the other system.

The strongly marked longitudinal striæ in the auricles of sheep- and cattle-embryos were repeatedly seen by Schwalbe

¹ Die Formentwick. d. Ohrmuschel. *Centralbl. f. d. med. Wiss.*, 1887, Nos. 39, 40, and 41.

and myself at a certain stage in the auricle of human embryos.

We occasionally see in the human auricle, as an anomaly, a minute stripe, which belongs to the set of longitudinal striæ, in the so-called triple division of the antihelix. This is represented by the third anomalous division starting from the locality of the usual bifurcation of the antihelix or about the middle of the upper limb, and running backward and upward toward "Darwin's tip." I have also seen in a few other human specimens a second stripe less marked than the one just mentioned, converging posteriorly with the same, and belonging to the system of longitudinal striæ.

The oblique striæ in transverse sections in the longitudinal axis of the auricle are less distinctly represented in man, but to this group belong: (*a*) the body and upper limb of the antihelix; (*b*) the lower limb of the antihelix, which in its development, as well as from an anatomical point of view, is different from the rest of the antihelix.

I consider it interesting and worthy of publication that, amongst the anomalies of the human auricle I have recognized the existence of two well-pronounced striæ which must be regarded as accessory antihelices. And as such have never before been mentioned by any author, I will briefly describe them.

One of the striæ which is rarely so perfect as the first photograph represents it, marks the elongation of the lower limb of the antihelix downward and forward, so that the stripe, although bent into an S-shape, runs almost parallel with the antihelix itself, and terminates on the floor of the cymba conchæ directly over the crus helicis. Generally we see nothing that corresponds to the lower member of the antihelix or that portion of the stripe which runs as the middle isolated line on the floor of the cymba or concha.

The second very rare stripe is concentric with the body of the antihelix. Compare the photographs.¹

¹ The above communication is the substance of a paper read before the Otological Section of the International Medical Congress held in Berlin, August, 1890. The photographs exhibited there have been omitted in the present publication.

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DIAGNOSIS, PROGNOSIS, AND TREATMENT OF PROGRESSIVE DEAFNESS IN CHRONIC NON-SUPPURATIVE INFLAMMATION OF THE MIDDLE EAR.¹

BY PROF. GRADENIGO, OF TURIN.

Translated by Dr. J. A. SPALDING, Portland, Me.

THERE can be no doubt that the progressive deafness of chronic non-suppurative inflammation of the middle ear is one of the most important questions that modern otology has to consider.

We cannot say that all of the recent investigations and observations made in this province have been entirely fruitless, and yet it must be confessed that many important questions concerning the pathogeny and the treatment of this disease are still awaiting a solution. Pathology has demonstrated that the vast majority of inflammations of the middle ear with an intact *Mt*, are due to the extension of diseases of the naso-pharynx into the tympanum along the Eustachian tube. Bearing in mind this universal pathogenic doctrine, there is evidently no therapeutic value to be attached to all those fine distinctions which have been made concerning the various clinical forms of chronic catarrhal inflammations of the middle ear. The disease is generally characterized by a slowly progressive catarrhal process which usually has its seat in the middle ear, but which often extends to the inner ear, and so gives rise to more or less complete deafness.

¹ Read before the Otological Section of the International Medical Congress at Berlin.

From a prognostic point of view we can discuss two chief points:

1. Whether, together with the functional disturbances which are to be referred to the conducting apparatus, there may or may not be present functional disturbances which are due to trouble in the inner ear (absence of bone-conduction for the watch, diminution of hearing for high tones, and attacks of vertigo).

2. Whether the *Mt* is retracted or not.

These various occurrences may combine in the most complex manner in each individual case. We meet in our practice with forms representing the gradual transition from simple stenosis of the tubes to the so-called sclerotic inflammation of the middle ear; then, again, we observe the rapid transformation of a slight form into one more severe, in one and the same ear. The following are the most frequent types:

a. Moderate degree of concavity and hyperæmia of the *Mt*; watch heard on contact; diminution of hearing for low tones especially; constant or intermittent tinnitus; better perception for tuning-fork at vertex in the more affected ear; sclerosis of the tubes; hypertrophic inflammation of the mucosa of the naso-pharynx, with an occasionally increased or altered secretion from the former. Improvement occasionally observed after the use of the air-bag.

b. *Mt* not concave, but reddened and glistening; constant tinnitus; watch rarely heard on contact; fork not lateralized in either ear from the vertex. The rhinoscopic examination demonstrates slight alterations in the mucosa whilst dry; granulated pharyngitis is present. With proper treatment an improvement is easily attained.

c. *Mt* is whitish, occasionally thickened in spots, and not retracted at all; tube pervious; tinnitus occasionally persistent; vertigo never observed at all; watch not heard on contact; diminution of perception for high tones. Treatment brings about no improvement. Naso-pharynx nearly normal.

d. Objective condition about as in the last class but no tinnitus or vertigo; hearing for low tones noticeably

decreased. In this group of cases the morbid alterations must be largely referred to the sound-conducting apparatus.

e. Mt almost normal in appearance; the subjective symptoms are largely to be referred to the inner ear (persistent tinnitus of various qualities, attacks of vertigo, diminution of hearing for very high tones, and a positive Rinne). Slight alterations in the naso-pharynx.

We can say on the whole that in some forms the morbid alterations affect the *Mt* (hyperæmia and retraction of the same) and the tube, whilst in others it is the vestibular wall (stapedio-vestibular ankylosis) which has been attacked. Finally, there are cases in which the inner ear has suffered. Now these differentiations in the locality of the disease justify a difference in our prognosis of the case in question. The symptoms in the first class are for the most part removable, and can be improved by proper treatment even if not entirely cured, whilst if neglected they may assume the appertaining forms of the second and third group which are much more serious.

The morbid process in the last class has a tendency to become progressive (occasionally with great rapidity) and to lead to a degree of deafness which may in time become total. We can never be too guarded in our prognosis in every case because the forms of the first group, which with suitable treatment rapidly improve during the first fifteen or twenty days, occasionally deteriorate later, despite the continuation of the same treatment (or perhaps owing to the same?) and pass over into those cases of the second or third groups.

Which treatment is the best, in these chronic catarrhal inflammations of the middle ear which are so frequent and so important in their prognosis? When we look over the innumerable papers that have been written on the subject we are astounded, and at the same time discouraged, by the multitude of remedies that have been proposed to antagonize the disease in question. For their very number goes to prove their uselessness. These we may now collect into the following categories:

I. Direct treatment of the ear.

A. From the external meatus :

- a.* Massage of the ossicles (Lucae).
- b.* Massage of the *Mt* (rarefactor, *masseur* of Delstanche).
- c.* Surgical treatment within the tympanum (plicotomy, myringotomy, myringectomy, tenotomy of the tensor tympani [Weber-Liel, Cholewa], mobilization of the stapes [Miot, Boucheron]).

B. From the tube :

- a.* Catheterization ; simple air douche.
- b.* Injection of atomized remedies into the tympanum by means of the catheter (sal ammoniac, ether, chloroform, iodoform [Delié], iodine [Loewenberg], etc.).
- c.* Injection of liquid substances by means of the catheter into the tympanum (alkaline solutions [Politzer], iodide of potassium [de Rossi], pilocarpine, cocaine [Kisselbach], iodoform, vaseline [Delstanche], etc.).
- d.* Methodic introduction of celluloid bougies and massage of the tubes (Urbantschitsch).

II. Local treatment of the nose (irrigation, penciling, galvano- and thermo-cauterizations (Paquelin).

III. General treatment, such as iodide of potassium, arsenic, atropin, eserin, ergotin (Gradenigo), and quinine.

IV. Electric treatment (galvanic current [Brenner, Hagen, Erb], interrupted current [Eitelberg]).

If we leave aside the surgical treatment within the tympanum, and the naso-pharyngeal medication, of which I will farther on say a few words, we must after all confess that all of the remedies which I have just catalogued are of but little more than mere temporary use. The massage of the ossicles as recommended by Lucae is something that most patients cannot easily endure, though Delstanche's massage of the *Mt* by means of his *masseur* is much more advantageous and more easily borne. I have more than once observed that after trying this treatment the subjective noises have decreased in intensity, and occasionally, though only for a brief period, completely disappeared, while in the same patients the use of the air-bag either did not modify them at all, or even made them worse.

Good results are obtained in many cases by the use of the air-bag and the catheter, whilst the very same means in other cases seem to make the hearing worse, and to increase the intensity of the subjective noises. Loewenberg has demonstrated that the air douche is not indicated in the *dry forms* of inflammation of the middle ear, and that it may even urge the morbid process onward in its deleterious march.

So, too, the injections of liquids or atomized substances through the tubes into the tympanum produce but transitory results. It is, moreover, doubtful whether they do not actually increase the evil already present. In point of fact, such injections irritate and congest the mucous membrane of the entire *Mt*, as we can easily demonstrate by inspection; the improved hearing which follows the act is generally due to a mobility of the ossicles produced by the swelling and hyperæmia of the mucous membrane. Such constant and renewed irritation of the parts of the middle ear may tend to favor the advance of the morbid process.

The methodic introduction of bougies into and through the tubes may very advantageously assist various other methods of treatment, especially when catarrh or cicatricial strictures are present, but alone they are, in my opinion, of very little if any use.

I once expressed myself very favorably inclined to a general constitutional treatment,¹ such as ergotin and atropin, in certain forms of this disease, particularly on account of the nervous and vascular disturbances observed in many of my patients. But now I have to say that I have abandoned this idea *in toto*, and am inclined to regard these nervous and vascular disturbances as due to alterations in the mucosa of the naso-pharynx and tympanum.

The use of the galvanic current has never afforded any permanent increase of hearing to my patients.

It seems to me that the only way in which to obtain a rational and efficacious method of treatment is to study the exact pathogenesis of every case. Pathological and anatomical researches have taught us that in these cases we have to

¹ Sulla pathogenesi dell' anchilosi stapedio-vestibolare. *Rivista veneta di sc. mediche*, 1887.

do with a slowly progressive inflammatory process, which terminates in sclerosis and retraction. Clinical experience testifies that this process is analogous to those which are going on in the mucosa of the naso-pharynx, and that in the few cases in which our examination reveals no alterations in the latter district, the history of the patient shows that such must have been present at an earlier stage, so that from a practical point of view there arises before us the very important question whether chronic catarrhal inflammation of the middle ear is or is not of an infectious nature?

In order to obtain an answer to this question I have made a series of investigations, which I shall briefly mention.

A. I examined two cases (post-mortem) of typical chronic catarrh of the middle ear, under the microscope, for the presence of micro-organisms, but both resulted negatively.

B. I made investigations on the living by means of cultures, taking six cases of typical sclerosing otitis (after accurate sterilization of the external meatus, and of the material destined for the cultures) and making a large perforation in the *Mt* of the worse ear with the galvano-cautery. Through the perforation I passed a sterilized platinum wire moistened with water, pushed it on till it came in contact with the promontory, with which I distinctly rubbed it, and then I made in the usual manner cultures on various soils. The culture remained sterile in four cases, and in the other two there was only the accidental culture of the microscopic *cereus albus* of Flügge, a type often observed in the atmosphere.

C. Prof. Maggiora and myself examined the contents of the tube, with the idea that if the chronic catarrhal inflammation of the middle ear had any connection with infectious affections of the naso-pharynx, the pathogenic germs might easily pass into the tubes. I will not at this place detail the procedure that we followed, for it will later see the light elsewhere, but I may say in brief that we discovered nothing except a few specimens of the bacteria of putrefaction.

Basing our views on these investigations, we must believe that at least the atrophic and sclerotic forms of

catarrhal inflammation of the middle ear are quite independent of the influence of pathogenetic micro-organisms.

Our investigations in this line of thought were supported by the fact that all energetic antiseptic treatment of the disease in question was useless. We tried in vain the prolonged use of ten per cent. to twenty per cent. of carbolic acid and one per cent. of sublimate in the meatus. Irrigations with one to two per cent. of salicylated solutions were equally of no effect. And more than that, direct treatment of the mucosa of the tympanum through an opening made in the *Mt* with the galvano-cautery, and irrigation through the tubes with salicylated solutions with free exit through the external meatus produced no result at all or only so slight as to be inappreciable. But on account of the opinion that the chronic catarrhal affections of the middle ear, in general, are connected with peculiar pathological alterations in the mucosa of the naso-pharynx, we ought, instead of resorting to antiseptic measures, to try such as may influence the vitality of the tissues affected. Amongst these we have the galvano-cautery, nitrate of silver, iodine, etc. I treat the mucosa of the naso-pharynx directly, especially near the pavilion of the tubes, with a cotton-tipped probe in the shape of the usual Eustachian catheter. In addition to this, I employ Delstanche's *masseur* upon the *Mt*, but for not more than one minute at a time. Whenever the proper indications exist for its use, I employ the air-bag and the catheter, and bougies in the tube. In these ways I obtain very good results (permanent improvement of the hearing, even when the treatment is abandoned, and diminution of the tinnitus), and not only in fresh cases, but occasionally in those of longer standing, not alone in those in which there were great alterations in the mucosa of the naso-pharynx, but in others where such were entirely absent. Patients who had not obtained the slightest benefit from a long-continued direct treatment of the ear as well as injection into the tympanum, obtained, on the contrary, from careful treatment of the naso-pharyngeal mucous membrane, decided advantage.

ON THE PERFORATIONS OF THE MEMBRANA
FLACCIDA SHRAPNELLI, WITH REMARKS ON
THE FORMATION OF CHOLESTEATOMA.

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(With six figures in the text.)

THE purpose of these pages is to furnish a small contribution to the study of suppurative inflammations of the middle ear that are accompanied by perforations in Shrapnell's membrane. This form of suppuration of the middle ear has so much that is characteristic in its manner of development, course, and sequelæ that it is strange that the attention of otologists has only been called to the importance of this condition within the last decade, the literature really beginning in 1883, when Morpurgo¹ gave a detailed description of this form of middle-ear disease, based on eleven observations. It should, however, be remarked that earlier authors have observed and mentioned it.

Moos² seems to have been the first who observed it, since he speaks in his "Klinik der Ohrkrankheiten" (p. 126) of a crescentric perforation above the processus brevis, with another perforation in the anterior segment, and again (p. 127) he says: "The perforations at the upper pole above the short process are remarkable, since they are rarely seen. I recollect some few cases in which I have found healed perforations in this region."

¹ Morpurgo: Beitrag zur Path. und Ther. der Perforationen der Shrapnell'schen Membran, *Arch. f. Ohrenh.*, vol. xix., p. 264, 1883.

² Moos, "Klinik der Ohrkrankheiten," Vienna, 1866.

In 1874, Orne Green¹ described the affection in a paper entitled "An Unusual Variety of Purulent Inflammation of the Tympanum." He considered it catarrhal inflammation that became purulent and finally total, "but the mucus secreted among the ligaments and other structures in the upper part of the tympanum is unable to gravitate to the floor of the cavity on account of its confined position."

In 1875, Blake² reported two cases of perforation of Shrapnell's membrane; in one case there was a second large perforation in the lower segment.

Burnett³ considered the affection rare, and reported five cases, one of which was not a perforation of Shrapnell's membrane, but merely a superficial inflammatory process caused by the irritation of a plug of cerumen.

In 1876, Buck⁴ described two cases of acute inflammation of Shrapnell's membrane, in which the remainder of the ear was not involved.

In 1879, Bezold⁵ referred to this question in his paper on the treatment of middle-ear suppuration with boric acid, and stated that those cases of suppuration in which there was a perforation of Shrapnell's membrane or a polyp at this point, were not adapted for this treatment. According to his observation, localized purulent processes behind Shrapnell's membrane causing perforation are not rare. He reported seven cases and gave a detailed account of the ætiology, pathogenesis, and symptomatology.

In the third volume of the *American Journal of Otology*, Burnett supplements the five cases mentioned in his book with five new ones, and distinguishes three varieties of the affection: (1) Perforation in the posterior portion of the membrana flaccida usually accompanied by marked pus-formation and deafness, and complicated with suppurative processes in the mastoid process; (2) central perforation

¹ *Boston Med. and Surg. Jour.*, Mar. 6, 1874.

² *Trans. Amer. Otol. Soc.*, vol. i., p. 546, 1875.

³ "The Ear: its Anatomy, Physiology, and Diseases," Philadelphia, 1877, p. 336.

⁴ Report of the First Congress of the Internat. Soc. of Otology and *Arch. f. Ohrenheilk.*, vol. xii., p. 313.

⁵ "On the antiseptic treatment of suppuration in the middle ear," *Arch. f. Ohrenheilk.*, vol. xv., p. 15, 1879.

accompanied by less suppuration and functional disturbance, and for the most part associated with diseases of the external canal; (3) perforation in the anterior portion of the membrane, usually accompanied by affections of the nose, tube, and tympanic cavity.

Following this come isolated reports by Prussak,¹ Schwartze,² Urbantschitsch,³ Marian,⁴ Habermann,⁵ and an exhaustive discussion of the question by Politzer,⁶ by which it appears that the matter had attracted some attention before 1883, but it was only after the appearance of Morpurgo's⁷ account of its pathological importance that the affection was generally recognized by otologists, and in the following years a series of important papers were published which led to the correct understanding of the clinical importance of the affection.

Morpurgo described the clinical aspect of the affection, and considered it a suppuration in Prussak's space. Hessler⁸ followed Politzer, and considered the affection a chronic suppuration of the system of cavities between the neck of the malleus and Shrapnell's membrane, first described by Politzer.

Kretschmann believed the seat of the suppuration to be more extensive, since in his opinion both normal and pathological conditions indicate that neither Politzer's system of cavities nor Prussak's space could be considered the sole location of the suppuration. The fact that the perforation is some distance from the processus brevis, or that the entire membrana flaccida is found to be destroyed, indicates that the suppuration is of far greater extent, and probing will show, in most cases, that far greater cavities are involved than those described by Prussak or Politzer.

¹ Prussak: On the Anatomy of the Human Membrana Tympani, *Arch. f. Ohrenh.*, vol. iii., p. 266.

² Schwartze in Klebs' "Handbuch der Path. Anat.," pp. 59-66.

³ Urbantschitsch, "Lehrbuch der Ohrenheilk."

⁴ Marian: Reports on Ear Patients Treated between Oct., 1878, and Oct., 1880, *Arch. f. Ohrenheilk.*, vol. xvii., p. 87.

⁵ Habermann: Report of Prof. Zaufal's Ear Clinic, 1880. *Arch. f. Ohrenh.*, vol. xviii., p. 86.

⁶ Politzer, "Lehrbuch der Ohrenkr.," 1878, p. 484.

⁷ Morpurgo, *l. c.*

⁸ Contributions to the Pathology and Therapy of Perforation of Shrapnell's Membrane, *Arch. f. Ohrenh.*, vol. xx., p. 121.

Kretschmann's investigations lead him to believe that the affection is localized to a space bounded externally by the tympanic portion of the superior wall of the external canal, together with the upper portion of the membrana flaccida, while the floor is formed by the membrane which fills the space between the outer wall of the tympanic cavity on the one side, and the malleus and incus on the other. The space is bounded internally partly by the head of the malleus and the corpus incudis, partly by the medial membrane, which descends from the roof of the tympanic cavity to the upper margin of the head of the malleus and the corpus incudis. The head of the malleus and the neck above the crista are included within this space; the malleo-incudal articulation lies, for the most part, outside. The communication between Kretschmann's space and the rest of the tympanic cavity is in the medial side of the space above the crus breve of the incus, which separates the aditus ad antrum mastoideum from the space like a septum. In some cases the communication is between the crus breve incudis and the pars squamosa of the temporal bone (*l. c.*, p. 176). The space is intimately connected with the mastoid antrum. While Prussak's space lies beneath Kretschmann's space, Politzer's system of cavities forms a part of the space, but is "relatively so small and delicate a structure that it need not be considered in this connection" (*l. c.*, p. 177). In cases of suppuration within Shrapnell's membrane, there are two points which attract the attention of the otologist, and make it difficult to understand how the disease has originated. In the first place, it is strange that a perforation of Shrapnell's membrane is never found in acute inflammation of the middle ear; and secondly, it is difficult to understand how middle-ear suppuration which has developed from infection per tubam can be localized behind the membrana flaccida without there being, as is often the case, actual pathological changes in the remainder of the tympanic cavity. Walb¹ attempted to explain the cause of this

¹ Walb, Ueber Fistelöffnungen am oberen Pole des Trommelfells. *Arch. f. Ohrenheilk.*, 1888, vol. xxvi., p. 185. Bezold, Cholesteatom, Perforation der Membrana flaccida Shrapnelli und Tubenverschluss. *Zeitschrift f. Ohrenheilk.*, 1889, vol. xx., p. 5.

condition in a new and novel manner. He believed that there were rare cases in which a primary middle-ear suppuration was the cause of the development of a fistula at the upper pole of the membrana tympani, but that in the great majority of cases an affection of the external ear produced it. This occurs (1) either because an otitis externa circumscripta affects the point between the membrana flaccida and the wall of the external canal, or an otitis externa diffusa encroaches upon Shrapnell's membrane; or (2) because a disease of the external ear, accompanied by secretion,—the region of Shrapnell's membrane not being affected,—produces an infection of the tympanic cavity inside the membrana flaccida through the foramen Rivini. Walb believes such a foramen Rivini to be frequently present.

Bezold objects to this explanation until thorough investigations on the ears of new-born children have proven that a patulous foramen actually exists. Bezold has observed small dry openings at the upper margin of Shrapnell's membrane, but so long as a similar condition is not observed in new-born children, it is doubtful whether the perforations found in adults are normal or the results of previous suppurations.

As was stated above, it is very rare to find fresh perforations of Shrapnell's membrane in cases of acute suppuration of the middle ear. Bezold¹ says that he has never had an opportunity of meeting a fresh case of perforation and following it clinically. Brückner, in his atlas, has pictured a perforation of the membrana flaccida in a case of middle-ear suppuration. Among my cases of perforation at the upper pole of the membrana tympani, I have twice had the opportunity of seeing the disease in the beginning.

In the first case the disease developed while the patient was under my treatment for adenoid vegetations in the nasopharynx; in the other case the patient came to me two days after the perforation had taken place. The cases were as follows:

1. A man, æt. twenty, who had been operated on for adenoids Sept. 28, 1883, noticed a pain in the left ear some days later;

¹ Bezold, *l. c.*, p. 20.

there was a purulent discharge, and examination showed a perforation of Shrapnell's membrane just above the processus brevis ; the membrana tympani was diffusely swollen and red ; watch heard on contact ; communication with the tympanic cavity. The suppuration ceased after a week, with daily catheterization and injections of two per-cent. boric acid solution per tubam.

Oct. 23d.—There is a clear perforation sound ; watch heard at 40 cm ; no discharge.

Nov. 21st.—The exudation in the middle ear has disappeared ; discharged with normal hearing.

2. A man, æt. forty-nine, came to me September 14, 1887, complaining of having had a severe pain in the left ear six days before, at which time he was suffering with a coryza. His sleep was disturbed. Two days before, the ear began to discharge and the pain decreased somewhat, but returned at intervals and is most violent behind the ear. Neither giddiness nor nausea ; watch heard on contact, and the voice quite near the ear. He has a sensation of heaviness in the left side of his head. The mastoid process is sensitive to pressure, but otherwise normal. The external canal is filled with pus. The membrana tympani is red, tense, and swollen. Pus trickles through a small opening just above the processus brevis. No perforation sound with catheterization. I ordered four leeches to the mastoid, syringing with borax water, instillations of boro-glycerine, and the ice-bag.

Sept. 15th.—He felt better and had no pain, but his head was very heavy.

Sept. 16th.—There is severe pain in the ear and in the left side of the head ; mastoid not sensitive to pressure. The perforation is very small and located at the apex of the elevated Shrapnell's membrane ; the remainder of the membrana tympani is red and tense. Although the air passes into the proper tympanic cavity in catheterization, there is no perforation sound. Paracentesis was made downward and backward, and after this there was a clear perforation sound with catheterization, and the patient's head felt lighter. He was then treated with injections through the tube, and was discharged October 16th with the membrana tympani healed.

We have here two cases of acute middle-ear suppuration arising from tubal infection, and accompanied by perforation of Shrapnell's membrane. In one case the suppuration

ceased very quickly, because there was communication with the remainder of the tympanic cavity permitting tubal injections. In the other case the symptoms were more severe, and the course more prolonged because there was no communication, but when drainage was improved by paracentesis, the suppuration soon ceased and the perforation healed.

I can also report a third case belonging to this category :

3. A man, æt. seventy, was referred to me April 19, 1890, on account of a discharge from the left ear, which had developed two months before in the course of a coryza, after a nasal douche had been prescribed by his family physician. Severe pain came on in the ear at once, and discharge two days later. He has had a continuous feeling of heaviness in the left side of his head, now and then painful twitchings in the left cheek, and constant pulsation in the ear. The discharge has never been offensive ; no giddiness ; watch heard on contact ; the membrana tympani is red and swollen. Pus emerges from a small opening just beneath the roof of the external canal. There is no perforation sound, although the air penetrates into the cavity which is filled with exudation.

April 21st.—The external canal is dry, and at the point of perforation there is a bubble of pus the size of a pea.

April 22d.—There is less discharge through the perforation, but the remainder of the membrana tympani is swollen, red, and tense. A paracentesis was made with the galvano-cautery below ; a quantity of pus escaped, and the subjective symptoms were relieved.

April 23d.—The swelling of the membrana tympani has disappeared, and the perforation, which is closing, is seen to be just above the processus brevis.

April 29th.—The suppuration is less ; the perforation is closed ; the subjective symptoms are improved ; treatment stopped because of departure of patient.

This case was one of middle-ear suppuration of two months' standing, with perforation of Shrapnell's membrane. There can scarcely be a doubt as to the tubal origin of the disease, since the patient referred it to the coryza and especially to the nasal douche, which frequently, as is

well known, when used in cases of inflammation of the nasopharyngeal space, causes a spreading of the inflammation to the middle ear. It was not possible to demonstrate a communication between the tympanic cavity and the cavity within Shrapnell's membrane with the air douche, but on the other hand the constant trickling of the pus through the perforation with no marked signs of retention, indicated a connection. The drainage was bad, however, and therefore a paracentesis was made in the upper segment of the membrana tympani, and a quantity of pus permitted to escape. The suppuration in the cavity within Shrapnell's membrane, which served only as a passage-way for the pus into the remainder of the tympanic cavity, ceased in a few days; the perforation at the upper pole healed, and daily injections through the tube improved his condition, although the suppuration had not entirely ceased when the treatment was interrupted.

Granted that the disease had existed for some time before it was noticed, we might suppose that the chronic inflammation had compromised the vitality of the folds of mucous membrane which lie above the processus brevis, stretching from the outer wall of the tympanic cavity to the head of the malleus and the incus. The disease would sooner or later have involved the neighboring bony parts, and have caused a carious destruction of the malleus, incus, and roof of the tympanum. In the course of months or years, the usual picture of chronic suppuration in this region would have developed, and Shrapnell's membrane would have shown a larger or smaller perforation through which the probe would have passed into Shrapnell's cavity, whose extent would have been increased at the expense of the surrounding bony wall. If now the original communication between Shrapnell's cavity and the remainder of the tympanic cavity had become closed in the course of the disease by adhesions, cholesteatomatous masses, etc., the suppuration in the remainder of the cavity must have made itself a passage by perforating a new portion of the membrana tympani; then, besides the suppuration in Shrapnell's cavity, there would have been an apparently independent

suppuration in the remainder of the tympanic cavity, which would have escaped through the defect in the lower portion of the membrana tympani. Such a simultaneous appearance of two co-ordinated suppurations has been often reported, and I have observed it myself seven times. In other cases the suppuration in Shrapnell's membrane becomes chronic, but the communication with the remainder of the cavity continues open, and we have a clinical picture of which the following case is an example.

4. A boy, æt. thirteen, came to me January 6, 1890. He had suffered for five years with a discharge from the left ear, which had come on as an acute middle-ear suppuration in the course of a coryza, and had not been improved by repeated treatment. Apart from the offensiveness of the discharge and the deafness, he does not suffer particularly. The watch is heard at 30 *cm*, whispered words at $\frac{1}{2}$ *m*. The left external canal is plugged with cotton soaked in pus. The membrana tympani is thickened and shows extensive chalky deposits in its lower segment; it is covered with cholesteatomatous masses which are adherent above, and here there is a compressed but freely movable granulation mass. A bent probe can be passed by the granulations into the upper segment of the tympanic cavity. The granulations were cauterized with chromic acid, and injections of borax-water and instillations of boro-glycerine were ordered; the air douche was used daily. January 20th the suppuration had almost disappeared, the granulations were gone, and in the thickened and chalky membrana tympani a perforation of pin-head size was seen above and behind the processus brevis. Watch heard at 70 *cm*, whispered sounds the length of the room. January 30th the suppuration had ceased. The manubrium lay horizontal and was partly concealed behind the plica posterior; the perforation is dry but not closed.

In this case there was an open communication between Shrapnell's cavity and the remainder of the tympanic cavity. That there had been an inflammation in the tympanic cavity proper, which had run its course, follows from the pathological condition in which the lower portion of the membrana tympani was found; but while the inflammation

here had run its course, it continued unabated in Shrapnell's cavity, and only yielded to energetic local treatment.

Since in the four cases mentioned, there can be no doubt but that the inflammation in Shrapnell's cavity was of tubal origin, I am inclined, in opposition to Walb, to believe many cases to be caused in this way. In support of this view, I will give the ætiological factors of 27 cases of suppuration in Shrapnell's cavity from my own practice. These cases were observed in 34 individuals, 3 patients being affected in both ears. In 9 cases no immediate cause was discovered, in 5 individuals the affection came on in the course of an acute inflammation in the nose and naso-pharynx, and in 4 cases it began apparently as an acute middle-ear suppuration; 12 patients referred the beginning of the disease to childhood, but were unable to give the cause. The disease came on in 2 cases after scarlatina, and in 2 after a box on the ear.

In inquiring into the ætiology, it is striking that in a large percentage of the cases no definite ætiological factors are given. Only 38 per cent. of the patients were able to explain the manner in which the disease began. If these figures be compared with more extensive statistics of cases of middle-ear suppuration, this percentage is the more surprising. In the last three years I have seen 448 cases of chronic middle-ear suppuration; of these, 42 per cent. were unable to give a definite cause for the ear trouble. This shows that the frequent lack of an ætiological explanation of the suppuration in Shrapnell's cavity is no proof of the non-tubal origin of the disease. This lack is also due to the greater chronicity, together with the frequent disposition to a latent course. In my 21 cases in which no cause was assigned, the disease began in childhood in 12, and had lasted for a number of years in the other 10.

It will be seen from the figures that the disease is relatively more frequent in childhood, and this is perhaps due to the greater resistance which the membrana tympani possesses in childhood, and its greater ability to withstand the pressure of the purulent secretion. There being an increased resistance of the portion of the membrane below

the processus brevis, the greater relative frequency of perforation of Shrapnell's membrane in childhood is explained. It is also possible that the pus, encountering a greater resistance, attains a higher pressure in childhood, and more readily injects the fine mucous pouches in Shrapnell's cavity, which drain with difficulty, and this may be the reason why the disease has a greater tendency to localize itself to this region in childhood, and to become chronic.

The disease may undoubtedly arise from injurious influences in the external canal, but in these cases the fresh lesion must be seen before an injury coming from without can be considered the primary cause of the disease. That the suppuration in Shrapnell's membrane occurring after external injuries is, as a rule, secondary, follows from the fact that neither direct nor indirect ruptures occur in Shrapnell's membrane, but always in the other portions of the membrane, and chiefly in the posterior superior segment. I have never seen a fresh rupture of Shrapnell's membrane, nor has Politzer¹ or Schwartze.² It seems strange that Shrapnell's cavity should have such a tendency to isolated suppuration when the remainder of the cavity is not involved; it is not rare to have suppuration in Shrapnell's cavity with relatively good hearing, and the remainder of the membrana tympani of normal appearance. Since it was not easy to understand how the tympanic cavity, which serves as a passage for the pus, can recover with so few changes as it does in many cases, otologists were reserved about accepting the tubal origin of the disease. Walb then advanced the new theory that "in the great majority of cases" a disease of the external ear is the cause of the fistula in Shrapnell's membrane. Walb must believe one of two things, either that the infection occurs because Shrapnell's membrane is destroyed by a local purulent process in the external canal at the transition point between canal and membrane, or he considers a persistent foramen Rivini the channel through which the infecting material passes into Shrapnell's cavity.

¹ Politzer, Text-Book, 1878, p. 260, *et seq.*

² Schwartze, "Diseases of the Ear," 1885, p. 110.

The possibility of the correctness of the latter explanation depends on the possibility of proving the existence of a patulous foramen Rivini. Anatomists have differed on this point, and in the various works we find directly contrary opinions expressed. Koelliker,¹ Gruber,² and others recognize its existence, but not as a constant condition. Bochdalek,³ in 1866, described an obliquely-running canal, which was at times in front of the processus brevis, and at times behind it. But it was questionable whether this were not artificial, since Bochdalek was only able to demonstrate the presence of the canal after long-continued probing with a fine brush. Schwalbe⁴ passed a brush through the membrana flaccida three times in fifteen cases, but he does not consider this experiment convincing. Bezold⁵ will not deny the possibility of small dry perforations being found in the upper portion of Shrapnell's membrane, but he doubts whether these are normal products, the more since he has never been able to find them in the new-born. My own investigations lead me to believe that no foramen Rivini exists normally, for in serial sections of the membrane at various ages I have found no trace of a patulous foramen.

If a simple microscopic examination of ear preparations is of little value in deciding this question, the otoscopic examination in the living is less so. For Shrapnell's membrane is so hidden, and has such a curved configuration, that when it is strongly illuminated the dark shadows may easily simulate a perforation when only a depression exists. It is this peculiarity in the form of Shrapnell's membrane that explains the frequent clinical error, for in sections of the membrana tympani *in situ*, striking the manubrium, a pocket-like depression is found in Shrapnell's membrane, so that the upper wall of the external canal passes over into the membrana flaccida under an obtuse angle, open upward (Fig. 1-4, p. 247). This condition is especially striking in

¹ Koelliker, *Handbook of the Human Tissues*.

² Gruber, *Text-book*, 1870, p. 91.

³ Bochdalek, *Prager Vierteljahresschr. f. d. prak. Heilk.*, 1866, p. 32. For the earlier literature on this subject, see p. 40 of his paper.

⁴ Schwalbe, "Anatomy of the Organs of Sense," 1877, p. 443.

⁵ Bezold, *Zeitschrift f. Ohrenheilk.*, vol. xx., p. 21.

sections which pass through or a little behind the processus brevis, and in such circumstances it is easy to see how this pocket might simulate an opening when examined clinically. Wirtz's¹ description of foramini Rivini seen clinically suggests the possibility of such an error, especially when he says: "The foramen is frequently seen to be cleft-shaped, so that the convex arch of the cleft lies just in the bony margin." Probing alone can give convincing proof, although a patulous foramen should give a perforation sound. This is often wanting, however, according to Wirtz, and this excites the more suspicion that a shadow has been mistaken for a perforation. Wirtz adds that a shrill perforation sound is not unusual, but from Bezold's investigations, and from my own, we must conclude that the defect in these cases is of pathological origin. In these observations it is not stated whether the diagnosis was made by probing or producing a perforation sound, or whether it rested solely on what was seen through the speculum. Those cases excepted in which there is a pathological defect in Shrapnell's membrane, I am inclined to consider all normally existing foramini Rivini as the expression of an optical illusion. Zaufal² has recently expressed a similar opinion: "Walb believes that the microbes pass through the foramen Rivini to the mucous membrane lining the cavity about the malleo-incudal articulation, and produce an inflammation of the attic of the tympanic cavity; but the existence of such a foramen appears to me not proven, and his diagnosis does not seem unquestionable if made in life when deception is so easy." Again he says: "I believe that most cases of inflammation of the attic receive their microbes, like the inflammations of the tympanic cavity in general, through the tube.

While to my mind there is no probability of microbes entering the middle-ear through a patulous foramen Rivini, there is a possibility that a localized inflammation of the external canal which caused a solution of continuity in Shrapnell's membrane might permit the entrance of microbes into Shrapnell's cavity, and so produce a localized suppura-

¹ Über das Foramen Rivini, etc. *Inarg. Dissert.* Oberhausen, 1886, p. 6.

² Zaufal, *Medizinische Wander-Vorträge*, April, 1890, Paris 19 and 20, p. 7.

tion in this region. It should be said, however, that if a furuncular or eczematous otitis externa be considered an ætiological factor, a post hoc has been mistaken for a propter hoc. While furunculosis of the cartilaginous and of the most peripheral bony portion of the canal is of frequent occurrence in the course of an offensive middle-ear suppuration, I have never seen furuncular disease in the deeper portions of the bony canal. This depends on the anatomical relations of the bony canal, and on the pathology of furunculosis. While the lining of the cartilaginous canal is thick, cutis-like, and provided with hair follicles and wax-secreting glands, these are all wanting in the lining of the bony canal, which is thin, intimately connected with the periosteum, free from hair and glands, and in the neighborhood of the membrana tympani contains a series of slender vascular papillæ.¹ We must except a small triangular portion of the roof, that extends several millimetres in the bony canal, and is similar in composition to the cutis of the cartilaginous canal.² This portion does not reach as far as the membrana tympani, but stops at a greater or less distance from it, and in the immediate neighborhood of the membrane the lining is free from glands and intimately connected with the periosteum. As it is now proven that the furuncular affection follows the shaft of the hair, while the stratum corneum remains intact,³ we can understand why furuncles do not develop in the deeper portions of the canal.

The case is otherwise with inflammations in the canal, caused by the pressure of foreign bodies which have lain long there producing abrasions and stagnation of the secretions. Here it is easy to understand how an undermining of the periosteal membrane may occur and through this a disturbance of nutrition in the underlying bony tissues and carious degeneration; in these cases the disease when it affects the margin of Shrapnell's membrane may destroy it, and thus open a passage for bacteria into Shrapnell's mem-

¹ Schwalbe, "Anatomy of the Organs of Sense," 1887, p. 437.

² Trölsch, "Anatomy of the Ear," 1861, p. 15-16. Politzer, Text-Book, p. 14.

³ Schimmelbusch, "On the Cause of Furuncle." *Arch. f. Ohrenheilk.*, 1889, vol. xxvii., p. 252.

brane cavity. Of the foreign bodies which are especially liable to cause a circumscribed destructive inflammation in the neighborhood of Shrapnell's membrane I would mention plugs of cerumen, when accompanied by an exudative inflammation from whatever cause, or by an otomycosis. It is well-known that in such cases, after the plug has been removed, moist ulcerations are found in the bony canal, and it is not impossible that Shrapnell's membrane may be perforated; but I believe, on the other hand, that in most of these cases there is a merely superficial ulceration with hypertrophy of the numerous vascular papillæ found here, without further destruction. As a rule these granulations disappear as soon as the canal is thoroughly cleaned. At times simple washing out is sufficient to cause the granulations to disappear, again, it is necessary to use chromic acid or the galvano-cautery. Such cases are mentioned in literature, and Burnett¹ reports one in which a plug of cerumen had caused pain in the ear, and after its removal "an ulcerated spot was seen on the membrana flaccida, immediately above the short process of the malleus." In a week the ulceration healed and the ear was normal.

The following clinical history will show how careful one should be about accepting furunculosis of the external canal as a cause of perforation in Shrapnell's membrane.

5. A woman, æt. thirty-three, came to me August 28, 1890, complaining of pain in the right ear and right side of the head, without apparent cause; for some days there had been a slight purulent discharge. Watch heard at 5 *cm*, low conversation only very near the ear. The wall of the external canal is infiltrated and furuncular, and sensitive to the touch; no perforation sound. The infiltration prevents the examination of the deeper portions of the canal. The hearing of the left ear was almost entirely lost from an old middle-ear suppuration with caries and necrosis. September 2d, the infiltration of the canal was so much less that a small suppurating fistula could be seen above the processus brevis. The perforation is covered with granulations which are very sensitive to the touch. No perforation sound with catheterization. Each local treatment of the ear brings on a severe

¹ "The Ear," etc., Phila., 1877, p. 342.

attack of head-ache. Hearing of the right ear has been poor for years. November 8th, she was chloroformed and a large carious cavity filled with cholesteatomatous masses, granulation tissue, and pus, was discovered between the wall of the canal and the membrana tympani. As the ear had been too sensitive to allow the introduction of Hartmann's canula I attempted to remove the malleus, but the neck broke off and only the manubrium came away; the carious cavity was then thoroughly scraped with the sharp spoon. The later treatment consisted in daily tubal injections and washing out the upper portion of the tympanic cavity with a Hartmann canula. December 11th, the suppuration had ceased and the membrana tympani was restored and partly adherent to the promontory. Upward and backward an opening passes to the carious cavity, which is cicatrized and quite dry. The headache is less violent and less frequent than before. The watch is heard at 25 cm, low voice at 1½ m. January 30, 1890, no suppuration and no headache.

If the patient had not explained that for years she had heard poorly with the ear, and if it had not been known that she always suffered with headache and dizziness after having the canal washed out, it might have been taken for granted that the infection had come from the external canal, if the extent of the carious process had not been discovered under chloroform. Similar to this was Hessler's¹ case, where a patient came on account of an acute furuncular affection of the canal, but the appearance of the ear indicated that the suppuration in Shrapnell's cavity had existed for years.

It is quite possible, as has been said, that the infection may come from the external canal; but here Shrapnell's membrane plays no more important rôle than the remainder of the membrana tympani, and the statement of Bezold,² that we are rarely able to demonstrate such a manner of infection for the remainder of the membrana tympani, holds in equal measure for Shrapnell's membrane.

And why should it be necessary to assume a different manner of development for inflammation in Shrapnell's

¹ *Arch. f. Ohrenh.*, xx., p. 218.

² *Zeitsch. f. Ohrenh.*, xx., p. 21.

membrane, than for that in the other forms of middle-ear inflammation? Do we not find that middle-ear inflammations, of whose tubal origin there can be no question, often limit themselves to particular portions of the middle-ear, *e. g.*, the antrum and the mastoid cells, and here run a chronic course, while the inflammation in the other parts ceases? The cause of this localization lies chiefly in the anatomical relations of the parts; the inflammation may limit itself to the mastoid cells, for example, because the drainage is poor on account of the form of the parts, and there is often retained secretion. Most frequently the middle-ear suppuration keeps pace with the inflammation in the mastoid process, although there are cases in which the inflammation in the tympanic cavity ceases, while the inflammation in the mastoid remains localized there. The following observation will illustrate this.¹

6. A boy, *æt.* six, was brought to me August 4, 1886. Two months before, the existing affection began as an acute suppuration in the right ear with severe pain, which prevented him from sleeping. He was treated with injections of warm water and instillations of boro-glyceride. Occasional pain in and behind the ear. Ten days before the discharge became less, and the mastoid region became sore and swollen. There is considerable fever and the patient appears emaciated. The skin is dry and burning; the canal is dry; the membrana tympani is healed, but is lustreless; the posterior wall of the canal is swollen. The watch is heard at 1 *cm.* The auricle is very prominent because of a superficially fluctuating abscess in the mastoid region. The neck is stiff, the head turned to the right. August 14th the abscess was opened, and a quantity of pus evacuated. The abscess lay under the periosteum toward the anterior margin of the mastoid process; on a level with the upper wall of the canal was a carious portion which was scraped out with a sharp spoon, leaving a defect that would admit the tip of the little finger. The wound healed, and the patient was not seen further.

In this case the inflammation in the tympanic cavity ceased, and the membrane was healed and lustreless, while the secondary mastoid affection took on an independent

¹ This case is given in my paper, "*Resectio processus mastoidei.*" *Nord. Med. Archiv*, vol. xx., No. 9.

character and necessitated operative interference. I have also seen cases in which suppurative middle-ear inflammation existed for some time without perforating the membrane, and where there was retention in the mastoid process. In two cases of this sort, which I shall give here, a paracentesis was first made, and then a mastoid operation.

7. H., æt. thirty-four, came to me July 5, 1887, with the statement that he had previously been well, and had had no signs of aural trouble until three months previously, when in the course of a coryza a severe pain came on in the right ear; the pain was very severe for a week, no discharge. Since that time he has not felt well, and is feverish at times. Transient pains in the mastoid, continuous ringing in the ear, and hearing very much affected.

The patient is emaciated and pale. The mastoid region is sensitive to pressure, but the soft parts are not infiltrated. In the middle ear there is seen a translucent exudation. Paracentesis was made, and the purulent exudation evacuated. Leeches were ordered to the mastoid, and the ice-bag was used.

July 6th.—The pain had almost disappeared; free discharge from the ear.

July 11th.—Patient feels well; free secretion; sleeps and eats well; mastoid not sensitive.

July 13th.—Pain for two hours in the mastoid. Redness and swelling of the bony canal. The perforation in the membrane being very small, was enlarged with the knife.

July 16th.—Pain again behind the ear, where the soft parts are swollen and œdematous. Free secretion. Evening temperature 38.4. Posterior wall of canal swollen and injected.

July 18th.—Under chloroform, an incision was made 1 cm behind the auricle, and the mastoid was opened with the chisel. Soft parts somewhat infiltrated.

				Temperature.	
				Morning.	Evening.
<i>July 16th</i>	.	.	.	—	38.4
" <i>17th</i>	.	.	.	37.7	38.3
" <i>18th</i>	.	.	.	37.7	38.3
" <i>19th</i>	.	.	.	38.1	38.3
" <i>20th</i>	.	.	.	37.6	37.1
" <i>21st</i>	.	.	.	37.6	38
" <i>22d</i>	.	.	.	37.4	37.8
" <i>23d</i>	.	.	.	37.1	—

The mastoid was blue and cyanotic; bled freely. Thick pus and granulation tissue were found just below the thin cortical lamella. Since the walls of the cells were intact and showed no signs of softening, a considerable portion of the cortical substance was removed.

The wound healed well and the patient was discharged.

In a second case, a man æt. fifty-four who had suffered for three months with severe pain in the ear, which began in the course of a coryza, I found the canal dry, the membrana tympani tense and pushed forward by a purulent exudation. The mastoid remained sensitive in spite of a paracentesis, and it was finally necessary to make a mastoid operation. Pus and granulation tissue were found at a depth of $2\frac{1}{2}$ cm. Injection did not show a communication between the tympanic cavity and the mastoid antrum.

There are besides these, numerous cases in which adhesions between the membrana tympani and the promontory isolate segments of the former, and these may become the seat of chronic suppuration while the remainder of the cavity remains uninvolved.

The normal anatomical relations of the mastoid process favor localized suppuration here, but the relations of Shrapnell's cavity are equally favorable. Shrapnell's cavity is a space of limited extent that is narrowed still more by the numerous mucous folds which pass from the head and neck of the malleus on the one hand, to the membrana flaccida and the tympanic portion of the upper wall of the canal on the other. Politzer has called attention to the smaller cavities so formed, and has pointed out their importance in pathological conditions, but Kretschmann who has recently studied the matter denies their importance and doubts their existence. Serial sections through the tympanum *in situ* have convinced me that this system of cavities really exists.

If we examine a series of frontal sections, passing from behind forward, in the posterior sections through the membrana tympani there will be found between the corpus incudis and the outer wall of the tympanic cavity, a large undivided space bounded inwardly by the incus and the lig. incudis (the fold that passes from the tegmen tympani to

the incus), and outwardly by the tympanic portion of the wall of the external canal. Following the sections forward,

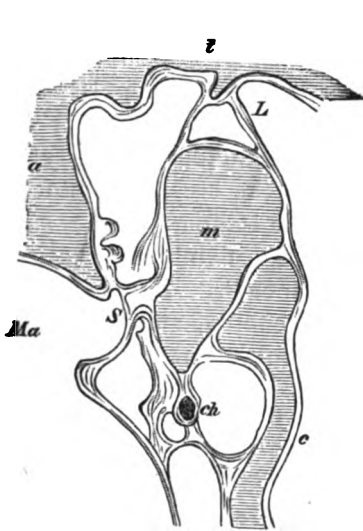


FIG. 1.

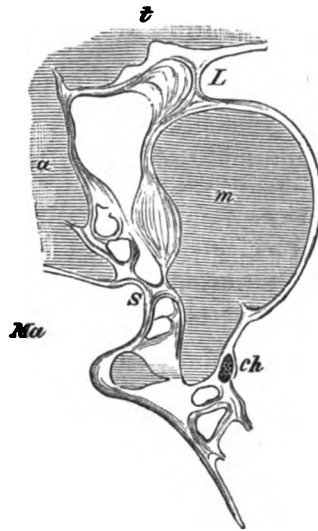


FIG. 2.

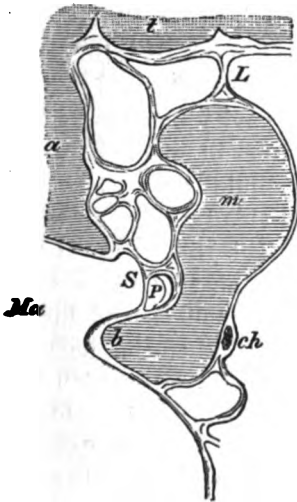


FIG. 3.

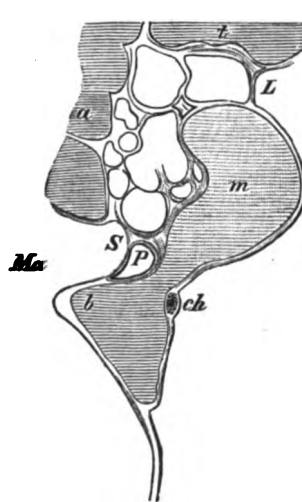


FIG. 4.

it is seen that this space is divided by a septum passing from the outer wall to the incus and crista mallei into an upper and a lower cavity. The junction of this fold with the

outer tympanic wall is anteriorly at the membrana flaccida, so that in sections that pass through the membrana flaccida (Figs. 1-4) the fold is seen to pass from the membrana flaccida midway between the processus brevis and the upper wall of the canal. This upper cavity corresponds to Kretschmann's "attic." The lower cavity, which is in communication posteriorly with the remainder of the tympanic cavity, is closed inferiorly near the crus longum incudis by a fold which contains the chorda tympani (Fig. 2, *ch*), and which is attached outwardly to the membrana flaccida and inwardly to the crus longum incudis.¹ Between the upper surface of the fold for the chorda, and the lower surface of the one mentioned above, stretching from Shrapnell's membrane to the incus and malleus, there is a cavity which continues forward above the processus brevis forming the so-called Prussak's space. Prussak's space extends forward generally as a single undivided antrum, which gradually assumes a pear shape and ends blindly near the processus brevis; in some cases, however, there are folds stretched through the space from Shrapnell's membrane to the neck of the malleus (Fig. 2). It is different with the large cavity which lies above the external fold of the malleus and incus. So far as this cavity belongs to the malleus, it is divided into a great number of spaces of irregular form, which communicate in part, and in part, especially posteriorly, open into the great undivided cavity between the lateral wall of the tympanic cavity and the incus. If the portion of the middle ear lying in the mastoid process be compared with that portion beyond the malleus and incus, the large posterior cavity would correspond to the mastoid antrum, while the entire system of cavities into which the large cavity breaks up anteriorly and which lies chiefly between the head of the malleus, the membrana flaccida and the tympanic portion of the roof of the external canal, would be the analogue of the mastoid cells. For short, I shall call the first portion: antrum Shrapnellí, and the latter portion: cellulæ Shrapnelli; Prussak's space may be considered to be included in the latter.

¹ Brunner—Contributions to Anatomy and Histology of the Middle Ear. Leipzig, 1870. Plate III.

I have found this system of cavities to be of much greater extent than Politzer supposed. In one preparation the whole cavity from the processus brevis to the tegmen tympani is divided into little spaces. The spaces contain air and are lined with epithelium ; although as the folds cross in every direction, some cavities give the impression of being filled with connective tissue.

This fine-meshed system of cavities gives us the key to the understanding of the diseases of this section of the tympanic cavity ; and I must say, in opposition to Kretschmann, that they are of the utmost importance in the suppurations occurring here. Just as the mastoid cells are often, from their structure, the seat of retained inflammatory secretions, so Shrapnell's cells, because of their small size and imperfect drainage, also become inflamed from retention.

The acute retention attacks in the mastoid have a severe and protracted course from the pressure that the secretion undergoes, enclosed by the bony walls, but the course of an acute inflammation in Shrapnell's cells is milder and more transient, since the secretion may distend the yielding walls, and, when it becomes necessary, easily perforate Shrapnell's membrane. If the whole attic were a large continuous cavity, primary retention of inflammatory secretion would hardly occur, as the cavity opens posteriorly into the general cavity of the tympanum ; but in Shrapnell's cells, on the contrary, such retention is easy. In accordance with this, it is found that it is particularly the anterior portion of Shrapnell's membrane that bulges in acute inflammations of this part, while the posterior portion, belonging to Shrapnell's antrum, is but slightly prominent. If perforation occurs it also is in the anterior half (just above and before the processus brevis), while I do not now remember to have seen a perforation in the posterior portion of the membrane. The case is otherwise with chronic inflammations in this region, for then the destructive process spreads and the posterior portion of Shrapnell's membrane may be involved ; but this is to be considered the expression of a secondary process. The fact that the perforation is in most cases a short distance from the processus brevis and above it would indicate

that retention is more frequent in the upper segment of Shrapnell's cells than in Prussak's space proper. The perforation may, however, lie close to the processus brevis and above it, a condition which can only be explained by retention in Prussak's space. It is clear that Prussak's space, a single tubular cavity with smooth walls, would be the seat of retention much less frequently than Shrapnell's cells. But here also it would appear that individual peculiarities may alter the case, as Prussak's space in some specimens is crossed by folds, which of course favor retention of secretion.

When the inflammation has existed for some time the disease spreads over the region of Shrapnell's cells and the entire attic or portions of it are involved. The destruction does not limit itself to the system of folds, but attacks the ossicles and particularly the malleus and the tympanic portion of the roof of the canal. In this manner the inflammation spreads and perforates the medial wall of Shrapnell's cavity, and the disease comes to be in the medial portion of the upper segment of the tympanic cavity (Hartmann's "cupola"). This segment may be in communication with the remainder of the tympanic cavity, or secondary adhesions may exist separating the cupola from the cavity proper. Hartmann¹ has described five temporal bones in which the cupola was entirely separated from the remainder of the cavity by pathological septa extending from the promontory to the malleus and incus, and from here to the outer wall of the tympanum.

A long-continued suppuration may, however, remain limited to Shrapnell's cells without causing extensive destruction, and certainly every aurist sees patients who come for treatment after having suffered years with ear diseases which have caused them little annoyance, and examination shows a small perforation above the processus brevis, through which the probe passes into a cavity a few millimeters deep, usually filled with pus and cholesteatomatous masses.

The reason for this chronicity of Shrapnell's suppuration does not lie in the anatomical relations of this region, but in

¹ *Deutsche med. Wochenschr.*, 1868, No. 45.

the fact that the disease is often accompanied with a desquamative process by which the pus cavity is filled with cholesteatomatous masses. These retard drainage and erode the surrounding walls. This desquamative condition may exist in different degrees, and may vary from the casting off of a few epithelial scales that may be easily removed with the rest of the secretion, to the formation of large coherent masses that fill the entire tympanic cavity and the mastoid antrum. The antrum and the mastoid cells were formerly considered the principal seats of cholesteatoma formation, but experience has shown that suppuration in Shrapnell's region is frequently accompanied with cholesteatoma formation. Bezold¹ said that all the cases of chronic middle-ear suppuration with perforation of Shrapnell's membrane that he had seen showed epithelial desquamative masses in the middle ear. In thirty-seven cases of which I have notes the formation of cholesteatoma was found thirteen times.

In some cases the cholesteatoma forms a dense pointed plug, with its base in the perforation and its apex projecting into the tympanic cavity. At first glance it would seem that there was a plug of cerumen on Shrapnell's membrane, but after it is removed there is seen to be a long projection, which may adhere tightly to the surrounding parts.

In other cases, where the pressure of the cholesteatoma has eroded the walls, an immense mass may be seen not only filling the upper segment of the tympanic cavity, but also extending into the mastoid antrum and the neighboring portion of the mastoid process.

8. A man, æt. fifty, came to me January 9, 1890. Hearing has never been good, and the left ear has discharged at times. Following an attack of influenza, the condition of the ear became worse ten days previously. The canal is filled with pus and disquamative masses. Watch heard at 2 *cm*; whisper at 20 *cm*. After daily injections and instillations of boro-glyceride the suppuration had almost ceased January 14th. In the anterior inferior segment there is a dry round perforation. The whole posterior superior segment and Shrapnell's membrane are destroyed, and

¹ *Zeitschr. f. Ohrenhkk.*, vol. xx., p. 8.

the entire defect filled with dense pearly cholesteatomatous masses which send out prolongations upward into the superior segment of the cavity, and posteriorly into the antrum.

The masses were gradually removed with forceps and Hartmann's canula. Through the large defect is seen, upward and backward, a large cavity lined with shining epithelial tissue, composed partly of the cupola and partly of the antrum. The incus is wanting. The manubrium is present. There was not much functional improvement. The patient's head, however, felt lighter after the removal of the masses.

In some other cases the pus from the middle ear contained small epithelial scales without the peculiar cholesteatomatous masses.

The pathogenesis of cholesteatoma has been much discussed of late years, without any very clear conclusions being reached. Virchow showed that cholesteatoma consisted of nucleated polyhedral cells larger than the epithelial cells of the tympanic mucous membrane; between these cells lie cholesterine crystals. Virchow's idea¹ that cholesteatoma was an actual neoplasm is now generally given up. They almost always occur in connection with inflammation of the middle ear, and are seldom seen independently (Lucae² and Wendt³). Böttcher⁴ supposes that cholesteatoma has its primary origin in the labyrinth, and may then develop from the epithelium of the aqueductus vestibuli, a supposition which Schwartz⁵, on clinical grounds, regards as correct.

While Kuhn⁶ follows Virchow in regarding cholesteatoma a true tumor, most investigators regard it as the expression of an inflammatory process. Wendt⁷ calls this "a desquamative inflammation," which causes a continuous casting-off of epithelium, which collects in the middle ear, and if the con-

¹ Virchow's *Archiv*, vol. viii., 1855; *Berliner klin. Wochenschr.*, 1889, Nos. 10 and 11.

² Lucae, "Contribution to the Study of Cholesteatoma of the Petrous Portion of the Temporal Bone," *Arch. f. Ohrenh.*, vol. vii., p. 258.

³ Wendt, *Arch. f. Heilkunde*, vol. xiv.

⁴ Böttcher, *Arch. f. Anal. und Phys.*, part iii., 1869.

⁵ Schwartz, *l. c.*, p. 221.

⁶ Kuhn, *Arch. f. Ohrenh.*, vol. xxvi., p. 63.

⁷ Wendt, *Arch. f. Ohrenh.*, vol. viii., p. 215., "Verhandl. der 46. Naturforscher. Versammlung," 1883.

ditions are not favorable for its escape, gradually fills the tympanic cavity. Lucae¹ supports this view. "It is easy to conceive that in purulent granular inflammation of the middle ear, in circumstances which are as yet unknown to us, a proliferation of epithelium may occur in the granulations, and the cast-off layers gradually collect in the cavity and finally form a cholesteatoma."

This epidermic transformation was demonstrated later by Steinbrügge,² Schwartz, and others, and is to-day generally accepted. Another question is how this degeneration proceeds. Bezold³ believes that the epidermis of the canal grows through the defect in the membrana tympani. In cases of marginal perforation, the portions of mucous membrane near the annulus tympanicus undergo a transformation, the cutis developing at the expense of the mucosa; if the membrana tympani be destroyed to a greater extent and the malleus handle be drawn so far inward that the point becomes adherent to the promontory, the epidermoidal proliferation begins at the point of contact. This migration of cutis may often be assisted by the presence of duplicatures of mucous membrane stretching across the cavity, and thus be conducted to distant parts as, for example, the mastoid cells or antrum.

Habermann⁴ reported a case of this sort, and with Bezold considers an epidermoidal migration, beginning in the external canal, as the underlying condition of cholesteatoma. Walb and Steinbrügge agree with Habermann, but Kuhn speaks of cases in which isolated cholesteatomatous masses are found in the intact mastoid cells, and he agrees with Virchow, while Barth, on the contrary, regards cholesteatoma as beginning in the degeneration of the mucous membrane.

The transmigration theory is at first glance attractive, but we look in vain for analogies in other parts of the body. So far as I know, no case of extensive migration of epidermis, at a point where epidermis and mucosa meet, has been

¹ Lucae, *Zeitschr. f. Ohrenh.*, vol. viii., p. 224.

² Steinbrügge, *Zeitschr. f. Ohrenheilk.*, vol. viii., p. 224.

³ Bezold, *Zeitschr. f. Ohrenheilk.*, vol. xx., p. 5.

⁴ *Archiv. f. Ohrenh.*, xxvii., p. 42.

observed elsewhere. There are, on the contrary, many examples of metaplastic changes in the mucous membrane of cavities which are the seat of chronic purulent inflammation, and a tissue purely mucus, comes to have a typical epidermoid character and a rete Malpighii. There are further examples of the casting-off of these transformed membranes, which then become mingled with the purulent secretion, and a product is formed similar to the cholesteatomatous masses in chronic suppuration of the middle ear. *Ozæna simplex* is an example of this.

In 1882, Volkmann¹ removed great pieces of the turbinated bones in patients suffering with *ozæna simplex*, and found that the ciliated cylindrical epithelium of the nasal mucous membrane had been transformed into pavement epithelium. Krause² and Fraenkel³ have made similar observations. K. Schuchardt⁴ published a year ago some investigations on the metaplastic changes in the epithelium of the nasal cavities in *ozæna simplex*. He examined bits of mucous membrane which had been removed from the upper portion of the nasal cavity with the sharp spoon (Figs. 5 and 6).

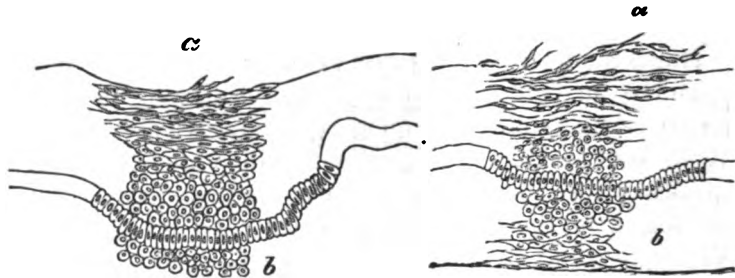


FIG. 5.

FIG. 6.

In place of the ciliated cylindrical cells, he found a laminated pavement epithelium, the superficial cells horny, and becoming loosened from the lower layers. I have often had the opportunity of studying this condition in prepara-

¹ Volkmann, *Centralb. f. Chirg.*, 1882, No. 5.

² Krause, *Virchow's Archiv*, vol. lxxxv., p. 325-343, 1881.

³ E. Fraenkel, *Virchow's Archiv*, vol. lxxxvii., p. 285, 1882.

⁴ K. Schuchardt, "Volkmann's Sam. klin. Vorträge," 1889, No. 340, p. 3233.

tions of the mucous membrane from the middle turbinated bone in ozæna patients, and I have found the ciliated cylindrical epithelial cells transformed into a laminated pavement epithelium with an underlying rete Malpighii (Fig. 5). If we examine sections of the membranes lining the cavities of the temporal bone, which are filled with cholesteatomatous masses (Fig. 6), we get a similar picture, in that the cavity is lined with a laminated pavement epithelium having beneath it a rete Malpighii. If a comparison be made between the secretion in ozæna simplex and the cholesteatomatous middle-ear secretion, it will be seen that the morphological elements are identical.

A migration of the epidermoid layers of the cutis does not take place in the nose in ozæna simplex, nor does a solution of continuity exist at the margin between cutis and mucosa—a necessary condition for such a migration in Bezold's sense.

It therefore appears more probable that the anatomical conditions found in ozæna simplex and desquamative middle-ear suppuration are the result of the mechanical pressure of the exudation upon the underlying epithelium. It is well known that a cylindrical epithelium, when long subjected to mechanical insult, will assume an epidermoid character (Billroth¹). The ciliated cylindrical epithelium of the nasal cavity and of other parts become transformed into pavement epithelium in the course of protracted purulent catarrh, and the exfoliation of its superficial elements and their mingling in the secretion gives this latter a peculiar character, and such are the conditions met with in chronic middle-ear suppuration. Whenever the conditions are less favorable for drainage, and the pressure of stagnating secretion is greater, the metaplasia is found with a consecutive desquamative process.

It is especially in the antrum and the mastoid cells, as well as in Shrapnell's cavity, that conditions particularly unfavorable for drainage are found, and, in accordance with this, the formation of cholesteatoma goes here hand in hand with suppuration. It goes without saying that any portion

¹ Billroth, *Deutsche Klinik*, 1885, p. 497.

of the middle ear may become the seat of this metaplastic process, if it be long enough subjected to the action of an offensive purulent secretion, and it is natural, therefore, that these metaplastic changes in the epithelium should be found at the junction of canal and tympanum, as well as in the deeper portions of the tympanic cavity, and these parts which are continuously subjected to the metaplastic action of the secretion may become changed, without it being necessary to consider the condition one of "epidermic transmigration."

Explanation of the Figures.

Fig. 1-4 represent four successive frontal sections of the tympanic cavity of a boy, aged four.

The section in Fig. 1 is the posterior one, while Fig. 4 represents a section through the tip of the processus brevis.

Fig. 1 shows a single large cavity between the head of the malleus and the external wall of the tympanum, with mere suggestions of spaces in the floor at S ; but the condition changes as we go farther forward, and Fig. 4 shows the entire cavity subdivided.

a—outer wall of the tympanic cavity.

t—tegmen tympani.

Ma—meatus aud. externus.

S—Shrapnell's membrane.

m—head of malleus.

c—crus longum incudis.

L—superior ligament of malleus.

Ch—chorda tympani.

P—Prussak's space.

Fig. 5. Section of nasal mucous membrane in *ozæna simplex*.

a—surface of the mucous membrane.

b—subepithelial layer.

Fig. 6. Section of the lining membrane of a cholesteatomatous cavity in the mastoid process.

a—surface toward the cholesteatoma.

b—periosteal layer.

REMOVAL OF A REVOLVER-BULLET FROM THE
TEMPORAL BONE BY THE USE OF THE CHISEL.
RECOVERY, WITH PRESERVATION OF HEARING.

BY OSCAR WOLF, FRANKFURT-ON-THE-MAINE.*

Translated by CHARLES H. MAY, M.D., New York.

I AM prompted to publish the following short paper by perusal of the history of bullet-wound of the ear, which appeared in the *Archiv für Ohrenheilkunde* (Bd. xxx., S. 165). The case terminated fatally after three months and a half,¹ no operation having been performed. I believe this paper to be entitled to general interest, because not only was the life of the patient saved, but hearing in the affected ear was regained.

In all cases of bullet-wound of the ear previously published, and tabulated by Schwartz ("Chirurg. Krankheiten des Ohres," S. 358), hearing was lost; in fact, there are very few cases which did not terminate fatally. In this connection Schwartz (*l.c.*) says: "Bullet-wounds of the ear are almost always fatal. Those which have not proved so have been mere exceptions. There is danger of purulent erosion of the carotid when the bullet has become lodged in the temporal bone; death may also ensue after years as a result of purulent meningitis."

E. L., aged seventeen, was seriously wounded October 15, 1889, by a revolver discharged near by, the bullet entering the right ear. She fell, but preserved consciousness and was able to get

¹ Thiéry, Schuss in's Ohr, eine Verletzung des inneren Ohres herbeiführend. *Bulletin de la Société anatomique de Paris*, Mai, 1888, S. 528 u. ff.

up soon after. There was but little hemorrhage from the ear, and not much from the wound. According to the attending physician, Dr. Ebenau, moderate facial paralysis developed on the eighth day, and there was a slight purulent discharge from the external auditory canal. Two weeks after the injury I was called in consultation, and found the following condition :

The bullet had entered just in the front of the tragus, had crossed the external auditory canal obliquely, penetrated the posterior wall near the *Mt*, and had become lodged in the substance of the temporal bone. Illumination merely revealed the swollen and torn canal; *Mt* could not be seen distinctly. The bullet could not be detected with Nelaton's porcelain probe; only the hard, exposed bone of the posterior wall of the canal was encountered. There was moderate facial paresis; the lower lid did not close completely, and the right angle of the mouth drooped somewhat. There was neither vertigo, headache, tinnitus, nor vomiting. Deafness on the affected side was incomplete; the watch was heard at 2 *cm*, and whispering near the ear.

The questions which presented themselves were: "Where was the bullet lodged?" and "Should the latter be removed by operative interference?"

It was not likely that the bullet was lodged in the tympanum, because the injury which this would have done to the chain of ossicles and the pressure which it would have produced upon the fenestræ would, in all probability, have occasioned much greater disturbance of hearing, attacks of vertigo, and severe subjective noises. On the other hand, the unmistakable paresis of the facial pointed to the seat of the bullet in the neighborhood of the Fallopiian canal—between the carotid, sinus, and middle fossa—a region which was not very inviting for operating.

Taking into consideration the statistics just given in cases which were not operated upon, I felt that there was more danger in waiting than in operating. Besides there was a possibility that the facial paresis would disappear after extraction of the bullet.

I operated November 2d (sixteen days after the injury). I had had a small bullet-forceps constructed, bent at an angle like aural forceps.

The auricle was separated posteriorly and pushed forward; the periosteum of the bony auditory canal was loosened, and the posterior wall of the canal chiselled away. The bone was very hard, so that this stage of the operation proceeded very slowly.

Removal of a Revolver-Bullet from the Temporal Bone. 259

The apparent course of the bullet necessitated chiselling in a backward direction. Constant oozing of blood from the blood-vessels of the bone interfered with the view of the bottom of the canal which had been made with the chisel ; after this canal had reached a depth of $1\frac{1}{4}$ cm, the porcelain-tipped probe not yet showing the location of the bullet and the operation having lasted almost an hour and a half, we concluded to continue the operation after the lapse of forty-eight hours, hoping that the canal would then be dryer and the view less obstructed.

The operation was continued November 4th. After removing the bandage, I obtained a good view of the depth of canal, and after illumination, saw a small, shining, metallic point which left a lead discoloration upon the porcelain-tipped probe. I tried to chisel away the bone from around the bullet, so as to loosen it, but removal was very difficult on account of the change in form to an irregular mass of lead, as though cast into the osseous cells. Finally it was loosened with the forceps described above, separated by chiselling all around it and extracted with a dressing-forceps. After disinfecting the chiselled canal, it was seen that the bullet had rested directly upon the sinus, for the bluish wall of the latter could be distinguished.

The auricle was reattached, the lower end of the wound being left open. The subsequent course was favorable ; there was slight elevation of temperature at night after several days, dependent upon slight sloughing of the auricle which had suffered in its nutrition as a result of the operation, so that there was some atrophy of the upper portion.

After three weeks, faradization of the facial was begun, and caused a gradual improvement. The bony canal became pervious again, so that the *Mt*, now normal, could again be seen. The hearing-distance of the right ear was normal. After five months the slightly atrophied auricle served as the only external evidence of the severe injury, and of the perilous extraction of the bullet.

The course of the operation and the location of the bullet explain the complete recovery of hearing. The bullet had passed close to the *Mt*, going obliquely backward ; the resulting myringitis had caused a moderate diminution in the hearing distance, but had passed away in a short time without leaving any residue. During the operation, no im-

portant parts concerned in hearing were injured. The canal which was chiselled in the bone was located close behind the annulus tympanicus, so that the various parts of the tympanum and the semicircular canals remained intact. The facial nerve also seems merely to have been pressed upon, and not torn by the bullet. The occurrence of facial paresis only after several days was due to a neuritis from pressure; after removal of the bullet, and the use of the constant current, the neuritis subsided so that the nerve was again capable of conduction.

EMBRYO OXYURIS IN THE NOSE.

By THEODORE PROSKAUER.

ASSISTANT AT THE OPHTHALMIC AND AURAL CLINIC OF DR. SCHUBERT IN
NÜRNBERG.

(With Three Illustrations.)

Translated by CHARLES H. MAY, M.D., New York.

THE only kinds of animal parasites which have been found in the human nose, excepting the larvæ of flies, have been various varieties of worms. According to Tiedemann,¹ Mackenzie,² Schech,³ and Moldenhauer,⁴ ascarides, maggots, centipedes, earwigs, and pentastoma have occasionally been found. However, in every case, they were macroscopical, full-grown animals, which wandered from their accidental resting-place or were removed forcibly after having given rise to more or less severe irritation.

I was fortunate enough to discover microscopically minute worms in a patient's nose.

A female patient, thirty years old, complaining of neuralgia of the forehead and inner portion of the right eyelids, presented herself at the office of Dr. Schubert, who has kindly permitted me to publish her case. Examination of the nose revealed a deposit upon the right inferior somewhat hypertrophied turbinated body. I removed the deposit in order to examine it microscopically in glycerine. In the mucus there was a large number of very minute particles; with one exception these were

¹ Von den lebenden Würmern und Insekten in den Geruchsorganen des Menschen.

² Die Krankheiten des Halses und der Nase.

³ Die Krankheiten der Mundhöhle, des Rachens und der Nase.

⁴ Die Krankheiten der Nasenhöhlen.

found to consist of snuff. The exceptional particle, distinguished from the rest by its grayish-white color, gave an unexpected picture under the microscope. Through a homogeneous envelope, more or less twisted, granular, entwined forms were seen, without any distinguishable detail. After careful teasing, two different component portions could be distinguished; a number of scale-like formations, and from fifteen to twenty very small worms. The latter were about equal in size, 0.3—0.4 *mm* in length, and varying in breadth at different parts from 0.01 to 0.04 *mm*; one extremity was broad, the other pointed; within their thin, homogeneous envelope with double contour bent here and there, were granular contents; a tube could only be demonstrated and followed from the broad end corresponding to the opening of the mouth. 0.01 *mm* behind this spot it enlarged, became spindle-shaped, and at a distance of 0.03 *mm* it became narrow again. No other organs could be distinguished. They had been immersed in glycerine for twenty-four hours, so that spontaneous motion could no longer be demonstrated. I have endeavored to sketch one of them, magnified 100 diameters (Fig. 1); in two places the envelope burst in embedding, and some of the contents escaped. When I examined the animals in a fresh condition they were well preserved.

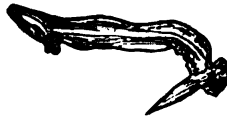


FIG. 1.



FIGS. 2 AND 3.

The next question was as to the species of the worm. A zoölogist of reputation pronounced them *oxyuris vermicularis*, and, as a matter of fact, they resembled the young forms of *oxyuris* which Leuckart¹ pictures. The size and embryonal character of the specimens before me indicated that they were undeveloped and could not have lived long. Leuckart, who describes the development of the *oxyuris* in detail, says that first there is formed a river bull-head shaped embryo, which changes to an elongated form with a pointed

¹ Die menschlichen Parasiten und die von ihnen herrührenden Krankheiten, Bd. ii., S. 328.

posterior extremity; this, as far as external appearances go, resembles the full-grown female, but no genital organs can be distinguished at this stage. This form the embryo persists in for a time after the rupture of the membranes; it simply increases in length from 0.14 *mm* at birth until it is 1.5 *mm* long. When it has acquired this length, it becomes covered with an integument and the genital organs develop; the female retains this same form and acquires a length of 10 *mm*; the male is only 4 *mm* long and terminates abruptly. The smallest embryo which Leuckart discovered free in the contents of the intestine was 1.5 *mm* long; Vix claims to have seen some 0.2 — 2.0 *mm* long in the intestines. Hence the worms which we are writing about were found in a very early state of development, very rarely observed, and probably never before seen outside of the intestines.

Full-grown, sexually-developed, emigrant oxyures and eggs containing embryos are very frequently found in the neighborhood of the anus; and very likely these eggs are carried to the mouth by dirty hands, so that they continue their wanderings in this channel of the same or some other host. Full-grown oxyures have also been found in the nose; only recently, Hartmann¹ reported such a case. However, how do embryos which have been developed for some time happen to be found in the nose? Could they have escaped through the action of the gastric juice upon the membrane and have developed afterward? We need not discard this theory when we remember that occasionally undeveloped animals leave the large intestine, and that these may then be carried to other parts. This supposition is supported by the fact that they were found in one mass. As regards the extraordinarily numerous scales, I cannot advance any explanation; I am content to report that they were colorless, striped slightly, 0.005 — 0.01 *mm* broad, and 0.06 — 0.08 *mm* long. Accompanying is an illustration of two of them (Figs. 2 and 3). I need not add that what I found was merely an accidental discovery without practical significance.

¹ Bericht über die Verhandlungen der otolog. Sect. der 61. Versamm. deutscher Naturforscher und Aerzte.

REPORT ON THE PROGRESS OF OTOTOLOGY DURING THE FIRST HALF OF THE YEAR 1890.¹

II.—PATHOLOGY AND THERAPEUTICS.

(Concluded from page 188.)

By A. HARTMANN, BERLIN.

Translated by DR. MAX TOEPLITZ, New York.

MIDDLE EAR.

56. ZAUFAL, Prof. E. Contribution to the treatment of acute otitis with reference to the results of bacteriological investigation. *Prager med. Wochenschr.*, 1890, Nos. 4, 5, and 6.

57. BUCK, A. H. Brief memoranda in practical otology. *N. Y. Medical Record*, November 9, 1890.

58. TODD, CHAS. A. Aneurism first recognized in the fundus of the ear, later appearing in the neck. *Trans. Amer. Otol. Soc.*, 1890.

59. RANDALL, B. A. Further notes on Schrapnell's perforation. *Trans. Amer. Otol. Soc.*, 1890.

60. LUDEWIG. Caries and extraction of the incus; contribution to the etiology and therapeutics of chronic suppuration of the middle ear. *Arch. f. Ohrenheilk.*, vol. xxix., p. 242.

61. RANDALL, B. A. Suppuration of the tympanic attic and perforation of Schrapnell's membrane. *Medical News*, September 27, 1890.

62. BURNETT, C. H. Permanently good results of excision of the membrana tympani and malleus in a case of chronic aural

¹ For the American otological literature this report takes in also the second half of 1890.

vertigo ; also in a case of chronic suppuration of the tympanic attic. *Trans. Amer. Otol. Soc.*, 1890.

63. HEPBURN, H. J. Report of a case of fracture of the malleus handle with luxation at the incudo-stapedial joint. *Trans. Amer. Otol. Soc.*, 1890.

- 64. BORNBOONE, TOMMASO. San Remo. Different forms of purulent tubercular otitis media.

65. ARBUTHNOT-LANE, W. The treatment of pyæmia consequent upon disease of the middle ear unassociated with thrombosis of the lateral sinus. *Brit. Med. Jour.*, June 28, 1890.

66. TOTI, ADDEO. Resection of the apophysis of the mastoid in a case of the form as described by BEZOLD, etc. (Resezione dell' apofizi mastoide in un caso della forma descritta da Bezold, etc.) *Accad. med. fir. di Firenze*, June 28, 1890.

67. BRAUN. Successful trephining in cerebral abscess following otorrhœa. *Arch. f. Ohrenheilk.*, vol. xxix, p. 161.

68. RICHARDS, HUNTINGTON. Mastoid sclerosis as illustrated by a very typical and fatal case. *Trans. Amer. Otol. Soc.*, 1890.

69. POMEROY, O. D. Four cases of mastoid cell disease cured by Wilde's incision and proper antiseptic dressing. *Trans. Amer. Otol. Soc.*, 1890.

70. LIPPINCOTT, J. A. Mastoiditis interna purulenta following erysipelas. *Medical News*, October 11, 1890, and *Trans. Amer. Otol. Soc.*, 1890.

71. GREEN, J. ORNE. The treatment of inflammation of the mastoid. *Amer. Jour. of Med. Sciences*, December, 1890.

- 72. TILLEY, ROBERT. Four cases of disease of the mastoid. *Medical News*, August 30, 1890.

73. SABOURAND, M. Caries of the temporal bone. Ulceration of the carotid. (Carie du rocher. Ulcération de la carotide.) *Soc. Anat. Séance*, October 10, 1890.

74. SCHWARTZ. Twenty-eight cases of fatal diseases of the ear, with conclusions upon the treatment and fitness for military service in aural affections. *Deutsche Militärärztl. Zeitschr.*, 1890.

75. BRONNER, ADOLF, Bradford. Massage of the membrana tympani and the ossicula in the treatment of chronic catarrh of the middle ear. *Brit. Med. Jour.*, May 27, 1890.

76. FERRERI, GHERARDO. Result of histological examinations of polypi of the middle ear.

77. HAUG. Case of sarcoma of the tympanic cavity and of the mastoid process. *Arch. f. Ohrenheilk.*, vol. xxx., p. 126.

78. SCHWABACH, Berlin. Symptoms of intoxication after injections of sol. cocaini muriatici into the tympanic cavity. *Therapeutische Monatshefte*, 1890, No. 3.

79. BAUMGARTEN, E., Budapest. Advantages and disadvantages of treating the ear with cocaine. *Monatschr. f. Ohrenheilk.*, etc., 1890, No. 2.

56. The principles laid down by ZAUFAL for the treatment of otitis media acuta are as follows: "(1) Relief of the most unpleasant subjective symptoms; (2) strict attention has to be paid not to disturb the normal course of development of the primary agent of inflammation, uninfluenced by the interference of other pathogenic microbes, until the primary agent has died out. This ought not to prevent (3) the application of remedies which accelerate the course of development in an uninjurious manner, and which remove the products of inflammation together with the micro-parasites as speedily as possible from the seat of inflammation and make them incapable of living; (4) for restoration of the full functions, operative procedures." Zaufal does not prescribe antipyretics, since the fever forms an indication for paracentesis. Pain is relieved by hot poultices of aluminium aceticum; ear baths with Burow's solution or sublimate (1:1000) are also used. When the epidermis is imbued with moisture, instillations of cocaine (5-10 %) are beneficial. In the beginning of an acute otitis media the external meatus and the auricle should be disinfected and kept antiseptical (brushing with soap-water, irrigations with solutions of sublimate, 1:1000). The air douche should not be applied before the violent inflammatory phenomena have subsided. Massage may be used in addition.

57. BUCK relates two cases: *a.* That of a lady who had had a discharge from the right ear for many years, more profuse at times than at others. Her hearing power in that ear varied very greatly, and that without any assignable cause; the other ear was practically useless. Membrana tympani seemed regular, except that, on close examination, a suspiciously soft spot was felt with the probe at the posterior superior quadrant. On further trial with the probe, a perforation was found to exist at that

point and the cavity beyond—that is, the entrance to the mastoid antrum and the depression at the oval window—was found filled with granulations. As soon as these granulations were pushed back and an opening into the tympanum cleared, she heard well. The granulations were reduced by applications of nitrate of silver, and the patient was enabled to hear well continuously. The incus, it seems, was absent, and the mass of granulations stood in the way of a direct impact of the sound waves to the stirrup.

The second case was that of a young man suffering from nasopharyngeal catarrh with a sense of fullness in the ears, which was increased by the pressure of his steel spectacle bows on the mastoid, and some hardness of hearing. The patient considered malarial poisoning at the bottom of his trouble, took ninety grains of quinine, and was relieved of his troublesome symptoms.

SWAN M. BURNETT.

58. In TODD's patient there was a history of purulent otitis in 1858, with remaining hardness of hearing. There has been a pulsating sound in the left ear for seven or eight years. On inspection, a red soft tumor which did not pulsate was found on the floor of the meatus in front of the drumhead. It was incised, the hemorrhage was profuse and had to be stopped by the tampon. It was not reduced in size, and later an aneurism appeared in the neck below. No further history.

SWAN M. BURNETT.

59. RANDALL still contends for the greater frequency of "attic" disease than is usually conceded. In his last 500 ear cases he saw 15 of attic inflammation. He gives the histories, with drawings, of some 28 cases. In treatment he considers the intratympanic syringe the most reliable and efficient. He has never yet done an excision, but may do so in certain cases.

SWAN M. BURNETT.

60. LUDEWIG demonstrates in this paper the frequency of caries of the incus, and emphasizes on account of numerous histories of cases the necessity of extraction of the incus in certain cases of chronic suppuration of the middle ear. He found that after excision of the malleus the suppuration is frequently kept up by the carious incus, and, therefore, he performs always the extraction of the incus in addition to the removal of the carious malleus. The instruments devised by Kretschmann and Ferrer for this purpose not being satisfactory, he devised a novel instrument, which, however, "did not suit him for all cases. Ludewig's instrument, like that of Kretschmann, is a hook, which has to dis-

locate the incus into the field of vision. Ludewig operated in 32 cases, of which in 21 cases an acute infectious disease was possibly given as cause. The pathological condition of the ossicles was as follows: "The incus alone was carious in 11 cases; the incus together with the malleus in 16 cases; the incus therefore was carious altogether in 27 cases = 84 %." The operation is not without danger. Complete and permanent facial paralysis occurred once, temporary facial paresis twice. There occurred headache in addition in several cases, and vertigo of long duration. The success of malleo-incudal extraction, as observed heretofore in the 32 cases, is as follows: the suppuration is cured in 20 cases, with new formation of the drumhead in 5 cases, without restoration of the membrana tympani in 15 cases; 11 cases are not cured or still under treatment respectively; 1 case died, not owing to the operative procedure. RUMLER.

61. This paper of RANDALL is, in a measure, supplementary to the one published in the Trans. of the Am. Otol. Soc. for this year, some additional cases being given. He considers the affection much commoner than is generally held. He has seen 50 cases in 2,000 ear patients. He gives a *résumé* of the anatomy of the parts involved, and a picture of the clinical aspects. The treatment he recommends is cleanliness and drainage. He thinks that removal of the membrana tympani and ossicles will be necessary only in exceptional instances. SWAN M. BURNETT.

62. In BURNETT's first case there was a purulent and annoying vertigo and tinnitus accompanying a chronic aural catarrh with an intact sunken membrane. The malleus and the membrana tympani were excised, the tinnitus and vertigo disappeared and have not returned. The second case was one of typical attic disease which had long defied all kinds of treatment. The malleus and the whole of the membrane were excised with a complete relief to the attic disease; the discharge ceased entirely and a new membrane formed from the segment of Rivini down to the promontory. Hearing was slightly improved.

SWAN M. BURNETT.

63. In HEPBURN's case a hairpin was thrust into the ear, causing severe pain and some hemorrhage. The hearing was very much impaired. On examination the short process was very prominent and the handle apparently twisted with a white line extending across it from below upward and backward near its extremity. Inflation showed this to be a false joint. An opening

in the membrane finally occurred at this point and through it was seen a dislocation of the incudo-stapedial joint. The conditions are figured. Hearing had slightly improved.

SWAN M. BURNETT.

64. BORN BONE distinguishes two forms of purulent tuberculous otitis media chronica. The first form with not extremely marked symptoms, with small perforation and slight secretion, the other in extensive pulmonary infiltration with extremely swollen mucous membrane, extensive destruction of the membrana tympani and profuse secretion. The latter form is quite painful.

STRAZZA (Genua).

65. In this paper LANE points out that the mastoid antrum is usually situated nearer the upper than the posterior surface of the petrous bone; that the mastoid cells increase in size under the influence of the inflammatory process, and under these conditions, and sometimes normally, communicate with the antrum. Hence the dura mater of the posterior fossa and the lateral sinus are for a considerable area separated from these spaces by only a thin layer of compact bone. Further, the canal for the facial nerve lies to the inner side of the opening of the antrum into the middle ear, so that the former being opened, and a probe passed into the latter, the whole of the bone external to the probe may be gouged away with safety. An interesting case of middle-ear disease is quoted, from which it would appear that Lane looks upon thrombosis in the sinus as a distinctly curative process, to be encouraged by ligature of the internal jugular vein, at the same time taking care to prevent, as far as possible, septic infiltration of the clot by opening up the antrum and cells very freely and establishing free drainage.

URBAN PRITCHARD (London).

66. TOTI reports a case of perforation of the suppuration upon the inner surface of the mastoid process (Bezold's disease), and adds some remarks upon the form of the disease.

67. BRAUN adds to the eight successfully operated and permanently cured cases of cerebral abscess from the ear, as reported by VON BERGMANN in his monograph, "Surgical Treatment of Cerebral Disease," two cases taken from literature and one operated on by Schwartze in 1886. Opposite to these cases are seven cases published before, and two from Schwartze's clinic with exitus letalis. Braun is justified in criticising this markedly small number of fatal trephinations as follows: "Many of these cases may not have been published, although just those in which an

autopsy could have been made would be much more instructive than the cured cases." Braun fully analyzes six cases from the clinic at Halle, in which an account of the diagnosis of cerebral abscess and abscess between dura mater and the bone, the trephining was performed. In three of these cases cerebellar abscesses had been present. In the first case, opening of the abscess, cure for three years; in the second case empty abscess cavity found during autopsy; in the third case no abscess was found, cure for one year. In two cases an abscess of the temporal lobe was found and emptied, but death ensued. In one case the pus had all gathered between dura and bone. The patient was cured by trephining. Of the fully reported, interesting histories it may be mentioned, that in one case (cerebellar abscess, cure) the preceding chiselling of the antrum opened the cavity only at the depth of 2.5 *cm*. On account of one case, in which a longish cavity of the size of a plum was found to be without contents, the author discusses the spontaneous cure of cerebral abscesses. Although traces of retrogressive changes of abscesses are found in autopsies, this case is the only one in which, without perforation or emptying by operation, an abscess cavity was found with firm walls, without contents. Braun requires for the trepanation an exact diagnosis. In one case of cerebellar abscess Schwartz opened the skull between the emissarium mastoideum and the protuberantia occipitalis, in the other case 4 *cm* behind the attachment of the auricle. The opening in the bone should be large (3 *cm*), and the operation performed with the chisel. If the abscess is manifest, the dura should be extensively incised at once. Schwartz then introduced in three cases the aspirating needle, in order to open it extensively after its disclosure. In one case he irrigated the abscess cavity with sublimate (1:1000). The abscess cavity is filled loosely with iodoform gauze after having introduced a wide drainage tube. The dangers of and the objections to the operation are as follows: 1. Difficulty of diagnosis; 2. Infection of the wound, which still frequently occurs in spite of antisepsis; 3. Quality of pus and of the abscess wall. The pus will mostly require irrigations on account of its thick consistence. In case of a thick abscess membrane the extirpation of the entire capsule must be considered according to von Bergmann's method. 4. Soft consistence of the cerebrum and thinness of the abscess wall. Through the latter the perforation of the abscess membrane through the drainage tube took

place in one of Schwartze's cases. 5. Hemorrhage. Injury to the arteria meningea media is of great danger, which then requires circumligation. 6. Prolaps of the cerebrum is always the consequence of increased intracranial pressure. The treatment, apart from the indicatio causalis, that is, the removal of the retention of pus below the prolapse, is simply antiseptic, and in imminent inflammation antiphlogistic. 7. Certain subjective symptoms may remain and epilepsy may follow. Some surgeons neglect the aural affection, which causes the cerebral abscess.

68. RICHARDS gives a long and detailed history of a case of what he considered mastoid abscess, in which the pneumatic and diploëtic structures were converted into dense sclerotic tissue. Unfortunately, no post-mortem examination was made, and the seat of the abscess cannot be definitely stated; but a hole 27 mm in depth was drilled into the mastoid. In fact, the author thinks the petrous portion of the temporal bone was invaded, and one of the semicircular canals opened. The author thinks the process started from a middle-ear inflammation, and he at different times removed polypi from what he calls the vault of the tympanum, or *fornix tympani*. He objects to the use of the word "attic" as applied to the space. The patient had several attacks of acute inflammation, which were usually relieved by the application of BACON'S artificial leech. The patient died of diffuse meningitis.

SWAN M. BURNETT.

69. POMEROY reports four cases of suppuration of the mastoid, with swelling over that region, in which, on making a Wilde's incision, a fistula was found, opening outwards from the mastoid cavity. These fistulæ were in no single instance enlarged, nor was any diseased bone scraped away. They were treated with iodoform gauze and antiseptic washes. A drainage tube seemed to retard healing.

SWAN M. BURNETT.

70. LIPPINCOTT'S patient had had erysipelas of the face and scalp, with the formation of two abscesses. Soon after, pus began to run from the right ear, and some time after there were signs of a mastoidal implication. Pus was found under the periosteum, $\frac{1}{4}$ inch above the upper wall of the meatus, but there was no connection between this and the cavity of the mastoid. The wall of the mastoid was very thin, and on breaking through it a quantity of badly smelling greenish pus was let out. The man made a good recovery.

SWAN M. BURNETT.

71. The actual statistics of GREEN'S paper are of 80 cases,

yet his general conclusions are based on about 250 operations. He divides his cases into four classes. I. In which there was no extension of the inflammation into the neighboring parts by œdema, swelling, or redness. II. In which there was an extension outward through the external cortex. III. In which the extension of the inflammation was forward through the anterior wall of the mastoid; and IV. In which the extension was downward through the base of the mastoid. In class I., there were 11 cases; in II., 51; in III., 5, and in IV., 13. Of the 80 patients, 62 were cured, 7 died, and the result in 2 was unknown. In no case does he consider that the operation had an injurious effect upon the hearing. Of the 7 fatal cases, 5 had active brain symptoms at the time of the operation, 1 had bilateral subperiosteal abscesses, and 1 died eleven days after the operation from acute septicæmia. In two cases an autopsy confirmed the diagnosis of meningitis. The two cases in which no pus was found were cases of osteosclerosis. In regard to diagnosis, he regards sensitiveness of the bone on pressure the most important single symptom. Œdema of the external tissues does not indicate pus in the cavity, but only pus on the external surfaces; or it may exist without pus. He has tried all methods of operating, but for the last three years has confined himself to the gouge and mallet for opening the bone, and the dental engine for enlarging the opening and removing irregularities of bone in the interior. He has given up metallic drainage tubes, using only rubber. He has several times exposed the dura and lateral sinus, but with no ill effects.

SWAN M. BURNETT.

72. In the first of TILLEY's cases the mastoiditis was relieved by rest and attention to the nose and pharynx; in the other three, the features which distinguished them from the ordinary run of such cases were the use of a modified FARRIER's knife, instead of a chisel or drill, in perforating the mastoid, and in the use of a 3-per-cent. solution of hydrochloric acid for injection. This latter he considers very valuable. SWAN M. BURNETT.

73. SABOURAND demonstrates a specimen of caries of the temporal bone, the patient from whom it was taken having died from a fatal hemorrhage. A lateral pharyngeal abscess had formed with spontaneous perforation, leaving a fistula. On account of symptoms of retention of pus, Dr. Kirnisson, surgeon of the hospital, trephined the skull behind and above the external meatus, and introduced here a drainage tube, curving it into the external

meatus. The child succumbed a few weeks later to a violent hemorrhage, which two days previously was preceded by a hemorrhage, but which was controlled by compression of the carotid. In autopsy the artery was found in the petrous bone to be denuded to an extent of more than 3 *cm* and perforated at one place. There existed three pharyngeal fistulæ. Laterally from the cerebellum a firm tubercle was found which had not produced any symptoms during life.

GELLÉ.

74. SCHWARTZ reports from the records of the medical department of the "ministry of war" 28 cases of fatal ear affections. The case of death was in two cases meningitis, in 10 cases cerebral abscesses, in 16 cases thrombosis of the cerebral sinuses, followed by pyæmia. The post-mortem examinations and remarks upon the phenomena during life are communicated and general conclusions are added.

75. In a paper read before the Leeds and West-Riding Medico-Chirurgical Society, Dr. BRONNER gives a very excellent summary of the methods which have been employed at various times to break down adhesions formed between the ossicula of the middle ear. He gives his experience more particularly of the methods of Delstanche and Professor Lucæ, but his results are uncertain, because, as a matter of routine, he appears in nearly all cases to use the catheter, Delstanche's method, and Politzer's bag in succession. If these failed Lucæ's probe was used, and out of 64 cases treated with the latter, improvement was only noted in 20.

URBAN PRITCHARD (London).

76. FERRERI has seen 117 cases of polypi of the middle ear. He emphasizes the fact, that he does not think it right to designate the granulations in chronic otorrhœa as polypi, and he distinguishes but two histologically different kinds of polypi: (1) fibrous with the structure of small fibromata; (2) myxomatous polypi. The latter are according to Ferreri more numerous. Four illustrations.

STRAZZA.

77. The sarcoma reported by HAUG had started from the tympanic cavity. Rapid growth led to death after eleven months under the appearances of facial paralysis and meningitis.

RUMLER.

78. On account of KIESSELBACHS' recommendation, SCHWABACH used in ear noises cocaine for injection into the tympanic cavity *per tubam*. In one case, in which he had injected five drops of a five-per-cent. solution, violent symptoms of intoxica-

tion appeared after the course of about a quarter of an hour. The author advises, therefore, to begin always with very small doses and to retain the patient in the office at least half an hour after the application.

79. BAUMGARTEN confirms Kiesselbach's observation of the beneficial results from the use of cocaine in tinnitus, which, however, is observed only in some persons and then only at certain periods. Tinnitus in affections of the labyrinth, hysterical and nervous noises (when no catarrh is present), rarer anæmic may be relieved. Five per cent. solution of cocaine acts also when injected through the catheter against tinnitus in otitis med. chronica, but never in marked sclerosis and quinine deafness. Baumgarten recommends cotton pellets imbued with a five- to ten-per-cent. solution of cocaine; the hearing improves then, and they are well borne, when other applications produce supuration. In one case he observed an excellent result after occluding a perforation with a small cocaine-cotton pellet. The action of the cocaine depends upon the contraction of the vessels and of the swollen mucous membrane, whereupon the ossicles vibrate more readily. In acute inflammations and nervous persons slight phenomena of intoxication are frequently observed when cocaine is used in the ear. KILLIAN.

NERVOUS APPARATUS.

80. GRADENIGO, Turin. The anatomical changes of the hearing organs in intra-cranial diseases, especially in the different forms of meningitis.

80. GRADENIGO reports the microscopical and macroscopical examination of the hearing organs of persons who died under meningitic symptoms. 1. Three cases of tuberculous meningitis. 2. One case of purulent meningitis. 3. Two cases of meningitis cerebrospinalis epidemica. 4. Two cases of cerebral tumors and one with apoplectic extravasation. Gradenigo arrives at the following conclusions: 1. In meningitis the inflammation implicates almost invariably the fibres of the acoustic and facial nerves. The inflammation which extends to the ganglion geniculatum of the facial does not attack its histological structure, while the acoustic is injured at the end of the porus acusticus internus, where the nerve branches. 2. In the intracranial affections lymphatic congestions frequently take place, which increase the electric irritability of the acoustic nerve. STRAZZA.

NOSE AND NASO-PHARYNX.

81. KAFEMANN, R., Koenigsberg. School examinations of the nose and naso-pharynx of 2,238 children, with especial reference to the tonsilla pharyngea and aprosexia nasalis.
82. FLATAU, THEODOR, Berlin. Laryngoscopy and rhinoscopy, including general diagnosis and therapeutics. Berlin, 1890.
83. KAUFMANN, E., Prague. A typical form of tumor of the mucous membrane (lateral ridge of the mucous membrane) at the external nasal wall. *Monatsschr. f. Ohrenheilk.*, etc.
84. HAJEK, M., Vienna. The perforating ulcer of the nasal septum. *Virch. Arch. f. Pathol. Anat.*, vol. cxx., No. 3.
85. MICHELSON, P., Koenigsberg. Tuberculosis of the nasal and oral mucous membrane. *Zeitschr. f. Klin. Med.*, vol. xvii., suppl. vol.
86. PATRZEK. Deviations of the nasal septum. *Verein der Aerzte Oberschlesiens at Oppeln*. May 1, 1890.
87. PATRZEK. Deviation of the nasal septum in the newborn. *Internat. klin. Rundschau*, 1890, No. 14.
88. ZIEM, Danzig. Curvature of the spinal column with obstructing nasal affections. *Monatsschr. f. Ohrenheilk.* 1890. No. 5.
89. KAFEMANN, R., Koenigsberg. A frequent indication for the use of electrolysis in the nose. *Therapeutische Monatshefte*, 1890, No. 3.
90. SEIFERT, Würzburg. Aristol. *Wiener klin. Wochenschr.*, 1890, No. 18.
91. LOEWENSTEIN. Aristol for treatment of ozæna simplex. *Internat. klin. Rundschau*, 1890, No. 20.
92. MEYJES, W., POSTHUMUS, Amsterdam. Treatment of ozæna. *Monatsschr. f. Ohrenheilk.*, 1890, No. 6.
93. TREITEL, Berlin. Reactive phenomena after operations in the nose. *Berliner klin. Wochenschr.*, 1890, No. 16.
94. NOLTENNIS, Bremen. Brushing off nasal polypi, and other applications of the nasal brush. *Therapeutische Monatsh.*, 1890, No. 3.
95. NOLTENNIS. The styptic action of Penghawar Djambie. *Ibidem*.
96. CHEVALLET, E. Treatment of nasal fractures with the

plaster-of-Paris apparatus. (Traitement des fractures du nez par l'appareil plâtré. *Thèse de Lyon*, 1889.

97. BLOCH, CALMAN. Empyema of Highmor's antrum, etc. Dissertation. Koenigsberg, 1890.

98. SCHMIDT, CARL, Odessa. On the treatment of empyema in cavities with osseous walls. *Berliner klin. Wochenschr.*, 1890, No. 7.

99. HALLEIS. Mucocoele and empyema of Highmors' antrum and the frontal sinus. *Med.-Chir. Centralbl.*, 1890, Nos. 18 and 19.

100. HANSBERG, Dortmund. Probing the accessory cavities of the nose. *Monatsschr. f. Ohrenheilk.*, 1890, Nos. 1 and 2.

101. BRONNER, ADOLF. On some relations between the diseases of the nose and the eye. *The Journal of Laryngology and Rhinology*, December, 1889.

102. LICHTWITZ, L., Bordeaux. Contributions to the study of nasal and pharyngeal reflex neuroses. *Prager med. Wochenschr.*, 1890, No. 6.

103. BUCK, A. H. On the renewed employment of the nasal douche and kindred procedures. *Trans. Amer. Otol. Soc.*, 1890.

104. EHRMANN, F., New York. The employment of acidum trichloraceticum in nasal and pharyngeal diseases. *Münch. med. Wochenschr.*

105. HEWITT, FRED. Anæsthetics in naso-pharyngeal operations. *Bost. Med. Four.*, Oct. 5, 1890.

106. ROHRER, Zurich. Case of rhinolithiasis. *Wiener klin. Wochenschr.*, 1890, No. 2.

107. RUALT, Paris. Four cases of rhinolithiasis (quatre cas de rhinolithiase). *Soc. fr. d'otol.*, May 10th, 1890.

108. KAFEMANN, R., Koenigsberg. Anatomical and therapeutical remarks on the fornix pharyngis. *Monatsschr. f. Ohrenheilk.*, 1890, No. 3.

109. BRONNER, ADOLF. On some affections of the bursa pharyngea. *The Lancet*, January 11th, 1890.

110. GERBER, P., Koenigsberg. Retro-nasal catarrh and its treatment, with especial reference to Tornwaldt's disease. *Therapeutische Monatshefte*, 1890, No. 1.

111. ZIEM, Danzig. Remarks upon Dr. Gerber's paper on retro-nasal catarrh and the so-called Tornwaldt's disease. *Therapeutische Monatshefte*, No. 4.

112. CARTAZ, Paris. Complications following the removal of adenoid vegetations (complications consécutives à l'ablation de végétations adénoïdes). *Soc. fr. d'otol.*, May 10th, 1890.

113. FELICI, FRANCESCO, Rome. Rapid removal of a naso-pharyngeal fibroma (exportazione rapida di un fibroma nasofaringeo). *Arch. Italiani Laringologia*, Anno x., No. 3.

114. UCHERMANN, Christiania. Naso-pharyngeal fibroma removed with the galvano-cautery. *Norsk. Magas. f. Lægevid.*, 1890, No. 6.

115. KRONACHER, Munich. Contribution of clinical cases of primary epithelial carcinoma of the hard palate. *Deutsche Zeitschr. f. Chir.*, vol. xxix., Nos. 2 and 3, p. 193.

81. KAFEMANN considers that latent naso-pharyngeal affections are frequently the cause of defective development of the body and mind. In consequence of the great indolence of the lower classes in naso-pharyngeal affections a great number of children are taken to schools for the weak-minded, which could be frequently avoided under early and appropriate treatment. Owing to these considerations, Kafemann examined 2,238 children in public schools and found hypertrophy of the pharyngeal tonsil in 7.6 per cent. of the boys and 10.6 per cent. of the girls. The oral tonsil was found to be enlarged 131 times in boys and 150 times in girls. In 22.4 per cent. of these the pharyngeal tonsil also was found to be hypertrophic. In boys the pharyngeal mucous membrane was granulated in 36.3 per cent. of all examined children, in the girls in 17.4 per cent. only. Considerable deviations of the cartilaginous nasal septum, eventually requiring surgical interference, were found 84 times in the boys and 50 times in the girls. Marked hypertrophy of the turbinated bodies, and exclusively of the lower ones, occurred 68 times in the boys. Kafemann has not observed any mucous polypi. Ozaena was found 10 times in the boys and 29 times in the girls. In the school for weak-minded children, Kafemann found in 15 boys, examined rhinoscopically, five times extreme hypertrophy of the pharyngeal tonsil, with disturbances of speech, the ear, etc. The author believes that early treatment could have extremely benefited these children.

JENS.

82. FLATAU's monograph is an introduction to laryngoscopy and rhinoscopy adapted to the requirements of the practitioner. The final chapter gives therapeutic indications.

83. KAUFMANN has tabulated thirty-seven cases, in which the lateral ridge of the mucous membrane—that is, hypertrophy of the lower margin of the hiatus semilunaris—was present, which has been first described anatomically by Zuckerkandl, and first observed clinically by Hartmann. In nineteen of these cases there existed empyema of the antrum and nasal polypi, in nine empyema only, and in eight ozæna simplex. The ridge is caused, according to Kaufmann, only by purulent catarrh of Highmor's antrum; its presence, therefore, proves inversely that empyema of the antrum is or has been present. The author considers as consequences of the formation of the ridge: obstruction of nasal respiration, occlusion of the "smelling cleft" with temporary or permanent loss of the sensation of smell, abolition of ventilation of the accessory cavities, permanence and incurability of suppuration of Highmor's antrum, continuous relapses of nasal polypi, pushing aside and atrophy of the middle turbinated body, and furtherance of development of ozæna from empyema of the antrum. For the cure of suppurations of the antrum (with irrigations through existing or artificial openings) and of accessory nasal polypi, Kaufmann considers the removal of the ridge (with knife and snare) as essentially necessary, because it hinders the natural efflux of the pus, and hides the masses of granulations and polypi, which become easy of access for the surgeon after its removal. The bilateral existence of the ridge in nine cases of ozæna points to suppuration of the antrum.

KILLIAN.

84. HAJEK arrives from his elaborate examinations at the following views: The perforating ulcer is, according to anatomical and clinical observations, a progressive necrosis of the mucous membrane and cartilage within the cartilaginous nasal septum, which frequently begins with hemorrhage in the mucous membrane and takes a chronic course, leading, without considerable changes in the surrounding mucous membrane, to perforation of the nasal septum (but is rarely cured before) and to spontaneous recovery after perforation. As a result of the ulceration, there remains a circular defect, with sharply defined, smooth edges. The process of ulceration is in no way connected with syphilis.

85. The tuberculosis of the oral mucous membrane (eight cases) invariably occurred in consequence of ulcerations, at times with masses of raspberry formation. The prognosis depends principally upon the intensity of the infection. Some cases recover under treatment with indifferent remedies, others defy

the most radical measures. One should, therefore, not overtax the curative action of certain remedies. The author praises menthol oil as an excellent analgetic only, which is preferable to cocaine and morphia on account of its lack of poisonousness. An unfavorable prognosis is offered by tuberculous angina (four cases). Weakening treatment exerts an extremely injurious influence upon the course of the disease. He warns, therefore, most urgently against mistaking the tuberculous for syphilitic affections.

ZARNIKO.

86 and 87. PATRZEK's first paper gives a general description of the conditions concerning the deviations of the septum. In the second paper Patrzek proves that deviations may also occur in the new-born while, as it has been heretofore supposed, the deviations of the nasal septum develop at the period of second dentition. Patrzek has three autopsies in children for this condition, making frontal sections through the nasal cavity. In Case 1 the septum is normal; in the other two cases it is deviated to the left side. Patrzek does not believe that these deviations have developed on account of anomalies during birth, but that they originate from an intra-uterine period.

88. ZIEM has proven before that in nasal affections asymmetry of the skull may take place. The consequence may be a curvature of the spinal column. LESSHAFT has produced scoliosis in dogs and rabbits by placing small weights upon one side of the head. Ziem observed that a boy, æt. four and a half, with congenital unilateral hypertrophy of the face, used to incline toward the opposite side. Since the head of the adult amounts to $\frac{1}{11}$ to $\frac{1}{12}$ (BRAUNE) and that of the new-born $\frac{1}{8}$ (VALENTIN) of the total weight of the body, it can be imagined that overweighting of one side of the head in early age may produce scoliosis. SCHECH speaks of scoliosis of the cervical spinal column only in consequence of early nasal obstruction. Ziem, however, has observed numerous cases of asymmetry of the entire spinal column in traumatic deviation of the septum and of the external nose or in stenosis of one nostril of long duration. In a very young rabbit, of which one nostril was freshened and sewed together, Ziem found after eight weeks the cervical spinal column and the sternum to be curved, the left half of the thorax flattened; and in a second rabbit treated in the same manner, the cervical spinal column turned around a sagittal axis and the lumbar spinal column showed a lordotic curvature. KILLIAN.

89. KAFEMANN has observed in three cases of galvano-caustic treatment of nests of nasal polypi adhesion between septum and turbinated body; he therefore urgently recommends the use of electrolysis. JENS.

90. SEIFERT among other cases has treated some nasal affections with aristol. Lupus was rapidly cured in one case, but not in others. A case of extensive nasal and pharyngeal syphilis was almost completely cured after treatment of twelve days' duration, but it is true that it was simultaneously treated with small doses of iodide of potassium. Repeated trials and careful examinations of the urine, for the presence of iodine, set free from the aristol, had a negative result. NOLTENNIS.

91. LOEWENSTEIN has used aristol in three cases of genuine and in one case of "syphilitic" ozæna, and he considers it superior to any of the host of remedies which have been recommended against ozæna. This remedy also can, according to the author, only mask the trouble, not cure it. NOLTENNIS.

92. MEYJES first plugs for twenty to thirty minutes, and then dries. He then sprays twelve drops of a 2-per-cent. solution of nitrate of silver into the cavity. Daily repetition of this procedure, with gradually stronger solutions (up to 25 per cent. after a week). He stops at 25 per cent., and instils more rarely, when improvement is observed. He has better results in this manner in days than with other remedies in weeks. KILLIAN.

93. Intense and alarming reactive symptoms have heretofore not been observed at the polyclinic of the university of Berlin for throat and nose patients after operations on the nose. Slight general disturbances frequently occurred. TREITEL draws special attention to the not unfrequently occurring angina. He thinks this angina lacunaris has to be considered as an accidental complication in such a way that "the operation causes hyperæmia of the nasal and adjoining mucous membranes, which dispose to the infection with the veins." The lymph apparatus does not play an essential part in this process. Treitel has frequently observed reactions from the nervous system as follows: Neuralgia, in some cases also physical depression. It is therefore advisable to recommend care for some days to the operated persons. RUMLER.

94. MICHELSON uses special brushes to brush forward nasal polypi which are situated in the posterior portion of the nose. The brushes are left inside, whereby the removal of the polypi is facilitated.

95. Under the name of Penghawar Djambi the chaffy hairs of tree-like ferns growing in Java and Sumatra are sold. The specimen is most appropriately mixed, according to Noltennis, with ordinary cotton, because it readily pulverizes when used pure. In consequence of the great elasticity and the slight faculty of imbibition of the drug, no after-bleeding takes place when the plug is properly introduced. The above-mentioned mixture is sold under the name of Penghawar-cotton.

96. CHEVALLET divides the fractures of the nose into three classes: 1. Fractures of the bone proper. 2. Luxations of the bones proper, mixed with the fractures, which are from time to time denied and asserted. 3. Fractures and luxations of the cartilaginous partition wall upon the vomer; they can be experimentally produced by splitting the cartilaginous partition wall. A continuous depression is then observed which extends from the bone proper to the nasal tip. The author rejects every inner supporting apparatus as useless. He recommends an apparatus of plaster-of-Paris, against which the luxated portions are pressed.

GELLÉ.

97. BLOCH's dissertation is based upon 26 cases of empyema of the antrum which has been treated in Michelson's polyclinic. The treatise contains a full discussion of all conditions pertaining to the subject. MIKULICZ's method (penetration from the lower nasal meatus) is recommended for treatment. Of 22 operated cases 13 were cured, 4 improved and still under treatment, 4 not cured, and in 1 the exitus is unknown.

98. SCHMIDT reports the histories of three cases of empyema of the antrum, which have been cured with Hartmann's method (irrigation from the middle nasal meatus).

99. This paper contains a synopsis of the most important relations to the diagnosis and treatment of the affection mentioned in the heading. The author's own observations complete the whole. He recommends the operation by means of WHITE's drill engine (Ziem). With regard to the diagnosis the author, according to my opinion, undervalues the usefulness of the exploratory puncture by means of suitably curved and strong PRAVAZ syringes (Michelson). The trephining of the frontal sinus does not need to be left to the surgeon, as the author believes. NOLTENNIS.

100. HANSBERG, in sagittal sections made from eighty autopsies of adults, has examined the relations of the entrance of the maxillary frontal and sphenoidal cavities. He found the hiatus semilunaris to be 24 mm long on the average and of quite varying width (up to

10 mm). The latter is essentially influenced by the bulla ethmoidalis which may be so large as to appear like a middle concha. The processus uncinatus was frequently turned quite inward or it was turned into a large osseous bulla. The situation and form of the middle turbinated body and the width of the middle nasal meatus varied greatly, and in one case facilitated probing or made it difficult in another. Accessory openings were found in every sixth or seventh case. Hansberg used for probing the anteriorly curved myrtle-leaf probe and reached in two thirds of his cases the antrum or at least the hiatus (apart from ozænas). The possibility of introducing a probe or canula respectively is, according to Hansberg, of decisive diagnostic importance and permits effective treatment without artificial opening of the antrum. If the result of irrigation is negative the patient is spared an exploratory puncture. The frequency of empyema seems, according to Hansberg, to be due less to the relations of the maxillary cavity to the dental roots, than to the frequent convenient entrance through the ostium or foramen secundarium for infecting agents from the nasal cavity, principally in purulent catarrh of the mucous membrane. Hansberg found only in one case the dental root to be prominent in the antrum. One specimen exhibited with total absence of the teeth a bilateral empyema. The floor of the maxillary cavity was on the left side 2 cm distant from the alveolar margin, the mucous membrane was more extremely swollen than on the other side, and an accessory opening was simultaneously found. Opening of the antrum from the fossa canina or from the alveolar process would have been very difficult in this case, and probably impossible from the lower nasal meatus. Hansberg, with regard to the frontal sinus, considers JURASZ's view as peculiar that probing was possible only when the point of exit of the frontal cavity could be seen; for in none of his numerous specimens could this place be seen, because it was invariably covered by the middle turbinated body (excluding the cases of ozæna and lues). In spite of this fact he has succeeded in probing half of the cases; in the other half he was hindered by the middle turbinated body, the anterior end of which had under these circumstances to be previously removed, when the probing in the living appeared to be desirable. The frontal sinus entered in Hansberg's cases not always into the hiatus, but in some cases anteriorly into the middle nasal meatus; two ostia were frequently, three rarely present. The canal running from the entrance to the

frontal cavity proper was mostly 12 mm, at times up to 20 mm, long, and was permeable for a probe of $\frac{1}{4}$ to 1 mm in thickness. The sphenoidal cavity could be probed in two thirds of the cases. The possibility of probing depends upon the width of the distance between middle turbinated body and septum. KILLIAN.

101. BRONNER reviews the experiences concerning the connection between affections of the eye and nose. Nasal affections may produce: lachrymation, dacryocystitis, conjunctivitis, muscular asthenopia, scotoma, amblyopia, glaucoma and orbital abscesses.

102. LICHTWITZ gives the histories of five cases in which neuroses were cured by local treatment of affections of the nose and pharynx. Then follows a discussion of the different theories for the establishment of such reflex neuroses. He distinguishes two categories of the latter, which are also of different practical importance. 1. Reflex neuroses in a limited sense, caused by lesions of the nasal and pharyngeal mucous membrane. 2. Neuroses of central origin, in which a simultaneous affection of the nose and pharynx is present. KLINGEL.

103. BUCK reiterates the warning against the employment of the nasal douche in the treatment of nasal affections which he thinks is again coming into vogue from the increased number of cases of middle-ear inflammation which have been recently referable to that cause. He recommends the use of a spray, not as a measure of primary consideration, but of secondary value after the local application of solutions of nitrate of silver.

SWAN M. BURNETT.

104. EHLMANN has tried the therapeutic action of trichloroacetic acid. It produces, applied to a mucous membrane, a dry, ivory-white, smooth eschar without any inflammatory reaction, which becomes detached mostly after two to six days. The author emphasizes the beneficial effect of trichloroacetic acid against that of chromic acid. It has no astringent action. KLINGEL.

105. HEWITT recommends that in the removal of post-nasal growths the best anæsthetic to employ is nitrous oxide with a small quantity of ether, and, as far as position is concerned, he speaks strongly in favor of Woodhouse Braine's method of raising the patient to a sitting position, opening the mouth with a gag, and bending the head well forward over a basin. In the removal of tonsils Hewitt recommends the alcohol chloroform-ether mixture. URBAN PRITCHARD (London.)

106. ROHRER gives the illustration of a large rhinolith, which was extracted from the left nostril of a woman, forty-eight years old, with quite considerable force, and after breaking off the peculiarly formed processes. The simultaneous aural affection (sclerosis) was considerably improved. NOLTENNIS.

107. RUAULT has observed among 3000 patients four cases of rhinoliths.

108. KAFEMANN's paper has been reviewed in these ARCHIVES in the anatomical part of this report, on page 167 of this volume.

109. BRONNER reports four cases of bursitis pharyngea. He recommends the use of a curette, which is somewhat narrower than Hartmann's.

110. GERBER arrives, from an examination of 61 cases of naso-pharyngeal catarrh, at the following views : 1. Many symptoms, the causes of which were formerly not looked for in the nose and pharynx, are but partial phenomena of the retro-nasal catarrh, which is one of the most frequent affections of the upper respiratory tracts. 2. The diagnosis of retro-nasal catarrh can be made positively only by pharyngo-rhinoscopical examination. 3. In the affection are implicated either : *a*, the entire mucous membrane of the pharynx equally ; or *b*, principally isolated fissures of the mucous membrane of the fornix pharyngis ; *c*, principally the middle tonsillar fissure, which is mostly the deepest. 4. Rosenmüller's fossæ also may serve to retain secretions to a great extent, especially if the folds of the mucous membrane are divided into rows. 5. There are cases of atrophic catarrh, exclusively localized at the fornix pharyngis, in which a moderate fetor or ore usually exists. 6. It is important for the treatment to learn the origin of the discharge. JENS.

111. ZIEM opposes these assertions, remarking that Gerber had not succeeded in proving that in his cases the suppuration had not originated in the nose.

112. CARTAZ reports violent hemorrhage after the removal of adenoid vegetations. The treatment consists of hot astringent injections. In severe cases plugging is necessary. In order to prevent infections the instruments should be made aseptic with great care.

113. FELICI reports a large pedunculated fibroma of the naso-pharynx, which was removed with the galvano-cautery snare.

114. At the meeting of the Christiania Medical Society, on May 21, 1890, UCHERMANN presented a patient, whom he had

operated for a naso-pharyngeal fibroma with the galvano-cautery knife. The patient, a merchant, twenty-six years old, had for the last ten years suffered from violent epistaxis. At such an occurrence the nose had been split at the hospital and a portion of the tumor removed without permanent recovery. At the beginning of the year the entire naso-pharynx was filled with a reddish-white, quite smooth, very hard tumor, which originated from the fornix pharyngis backward and upward, with a broad base, and gave off two branches into both nostrils. These filled the posterior portion of the nasal cavities entirely, and were partially adhesive to the velum and the lateral walls of the nose. These branches were severed in several sittings with the galvano-cautery knife without hemorrhage, whereupon the different portions were removed from the nose and pharynx with the galvano-cautery burner and snare. The speaker emphasizes the great advantages of this method of treatment over the former with the knife.

AUTOREVIEW.

115. A private gentleman, whose age was not stated, exhibited the very rare affection, which had existed at the time of the first observation for three years, viz., a carcinoma, probably due to mechanical irritation of the inflammatory base from a harmless dental abscess. The course was remarkable for the development of leukoplakia seu psoriasis from the very first beginning. Billroth among others has long pointed out the unfavorable prognostic importance of these epithelial proliferations as precursors of relapses of carcinoma. Although the disease lasts three years with comparative good health, the prognosis, according to Kronacher, is utterly unfavorable with regard to recovery on account of the implicated lymphoid glands and the epithelial proliferation in the surroundings of the fistula.

Moos.

ENGLISH NOTES.

A.—MEETINGS OF SOCIETIES.

LEEDS AND WEST RIDING MEDICO-CHIRURGICAL SOCIETY.—At a pathological meeting of this society on February 20th, Dr. Bronner showed (1) a series of post-nasal growths removed by Hartmann's curette, illustrating the different forms of hypertrophy of the pharyngeal tonsil and the formation of the so-called Tornwald's bursæ; (2) fibro-mucous polypi of the naso-pharynx; (3) portions of the inferior turbinated bones, removed by means of the dental trephine; (4) caries of the "attic," giving rise to cerebral abscess; (5) caries of the "attic" and upper cells of the mastoid, giving rise to phlebitis of the lateral sinus.

At a meeting of the same society on April 3d, Dr. Bronner read a paper upon the use of "The Eustachian Catheter in Disease of the Middle Ear."

At the meeting held on April 17th, the same gentleman showed specimens of diseased incus and malleus from a case of chronic otorrhœa. The malleus had been removed by means of a wire hook. Mr. Littlewood exhibited microscopic sections of a growth which had been found attached to the posterior extremity of the inferior turbinated bone.

ROYAL ACADEMY OF MEDICINE IN IRELAND.—At a meeting of the Section of Anatomy and Physiology held on March 20, 1891, Dr. W. H. Thompson showed a skull and specimens illustrating the anatomy of the middle and internal ears, and remarked upon the inaccurate descriptions usually found in text-books.

ROYAL SOCIETY OF EDINBURGH.—At the fifth meeting, held on February 2, 1891, Professor Rutherford read an interesting paper on "The Organ of Hearing," an abstract of which we hope shortly to be able to present to our readers.

CLINICAL SOCIETY OF LONDON.—At a recent meeting (May 8th) Mr. Stephen Paget described a case of cerebral abscess in which he had trephined the skull, a second trephining becoming necessary at a lower level after the lapse of eleven days. Mr. Paget drew attention to the voracious appetite which in this, as in five other recorded cases, had been such a prominent symptom. The patient made a very satisfactory recovery.

PATHOLOGICAL SOCIETY OF LONDON.—At the meeting on May 19th, Mr. Ballance exhibited a remarkably large exostosis that he had removed from the meatus of a young woman of twenty-four. The growth measured fully three quarters of an inch in diameter.

BRITISH MEDICAL ASSOCIATION.—The fifty-ninth annual meeting will be held at Bournemouth on Tuesday, Wednesday, Thursday, and Friday, July 28th, 29th, 30th, and 31st. President, Willoughby Francis Wade, B.A., M.B., F.R.C.P., I.P., Senior Physician, Birmingham General Hospital. President-Elect, John Robert Thomson, M.D., F.R.C.P., Consulting Physician, Sussex County Hospital.

APPOINTMENTS.

ALEX. BLACK, M.B., F.R.C.P. (Edinburgh), has been appointed Surgeon to the Eye, Ear, and Throat Infirmary, Edinburgh, *vice* Ross resigned.

A. I. BRADY, L.R.C.S., etc., has been reappointed Honorary Senior Aural Surgeon to the Sydney Hospital, New South Wales.

ADOLF BRONNER, M.D., has been appointed Honorary Laryngologist to the Bradford Infirmary.

Dr. I. K. LOVE has been appointed Aurist to the Deaf and Dumb Institution, Langside, Glasgow.

ARTHUR SANDFORD, M.D., M.Ch., has been appointed Lecturer upon Ophthalmology and Otology in Queen's College, Cork.

W. C. WILKINSON, M.B., etc., has been reappointed Honorary Assistant Aural Surgeon to the Sydney Hospital, New South Wales.

BEQUESTS.

By the will of the late Mr. W. Cramond, a manufacturer of Derby, the Derby Deaf and Dumb Institution obtains a legacy of £500.

The late Mrs. M. F. Burgess has, by her will, left the sum of £100 to the Eye and Ear Institution of Birkenhead.

Mr. Thomas Walker, of Doncaster, has bequeathed £500 to the Yorkshire Deaf and Dumb Institution.

B.—MISCELLANEOUS.

In the Post-Graduate Course at the London Throat Hospital on March 9, 1891, Mr. Mark Hovell lectured upon "Chronic Suppurative Inflammation of the Middle Ear and its Treatment."

In the *British Medical Journal* of March 21st, Dr. Bell, of Warrenpoint, County Down, records an interesting case in which a pea was removed from the external meatus, where there is every reason to believe it had been lodged for upwards of thirteen years.

There is undoubtedly, just at present, a tendency to over-estimate the importance of nasal disease as an exciting cause of aural troubles. Mr. Marmaduke Sheild's advice to the students of Charing Cross Hospital in this matter is well worth bearing in mind. Mr. Sheild concludes a clinical lecture upon the subject, with a plea for "accuracy in diagnosis, care in selection, and a distinct and rational belief that the patient will receive benefit from the operative procedures adopted."

"Bubble Remedies in Aural Surgery."—Under this title Sir William Dalby, in the *Lancet* of April 11th, passes in review certain methods of treatment, each of which has at one time or another been vaunted as the almost universal panacea for nearly every conceivable form of ear disease.

As Sir William Dalby points out, such remedies have usually their legitimate use, although their sphere of action is much more limited than the modern Cagliostros would have us believe, and it is their abuse, rather than their use, against which such an earnest protest is raised.

The credulity of people in general, and, it would almost appear, of deaf people in particular, seems to be unbounded. It only needed, for instance, some slight encouragement in certain quarters to induce a bold speculator to endeavor to float a company, with a capital of £10,000, for the manufactured sale of ear-drums!!

With regard to electricity, aural surgery probably suffers no more from this craze than do other departments of the healing

art. The production, and more especially the application, of this peculiar agent is involved in so much mystery, and the results which at times follow its use are so totally unexpected, that we cannot be surprised that it has charms for the lay mind.

In respect to the pilocarpin cure, we are reminded by the writer that even Politzer himself, the originator of the idea, has found it necessary to issue a strong protest and warning against its indiscriminate use.

But what will probably strike the reader of the article with greater force than anything, is the boldness with which Sir William Dalby unhesitatingly condemns useless and irrational surgical interference. Under this head he speaks of removal of the middle turbinated bone for deafness as a surgical procedure, —outside the pale of serious discussion, and he is equally outspoken in his remarks upon such other operations as division of the tensor tympani muscles, etc.

The paper, as a whole, is certainly a remarkable one, and will amply repay perusal. Conceived in a spirit of cynicism, its literary style is excellent, while it possesses still stronger claims for commendation on account of the valuable lessons inculcated "between the lines."

An Unusual Symptom in Middle-Ear Disease.—In the *Lancet* for May 16th, Mr. R. Lake records a case in which, after removal of post-nasal growths in a female æt. twenty-one, inflation of the middle ear by Valsalva's method, was accompanied by a report so loud as to be audible to the surgeon standing on the other side of the room.

London Post-Graduate Course.—On Thursday, June 4th, Mr. R. H. Stewart lectured at the London Throat Hospital on "Some of the Causes of Ear Disease."

AMERICAN NOTE.

Dr. A. G. SINCLAIR, Professor of Ophthalmology, Otology, and Laryngology in the Memphis Hospital Medical College, has been appointed Surgeon-in-Charge of the Eye and Ear Department of St. Joseph's Hospital in that city.

Fig. 2.

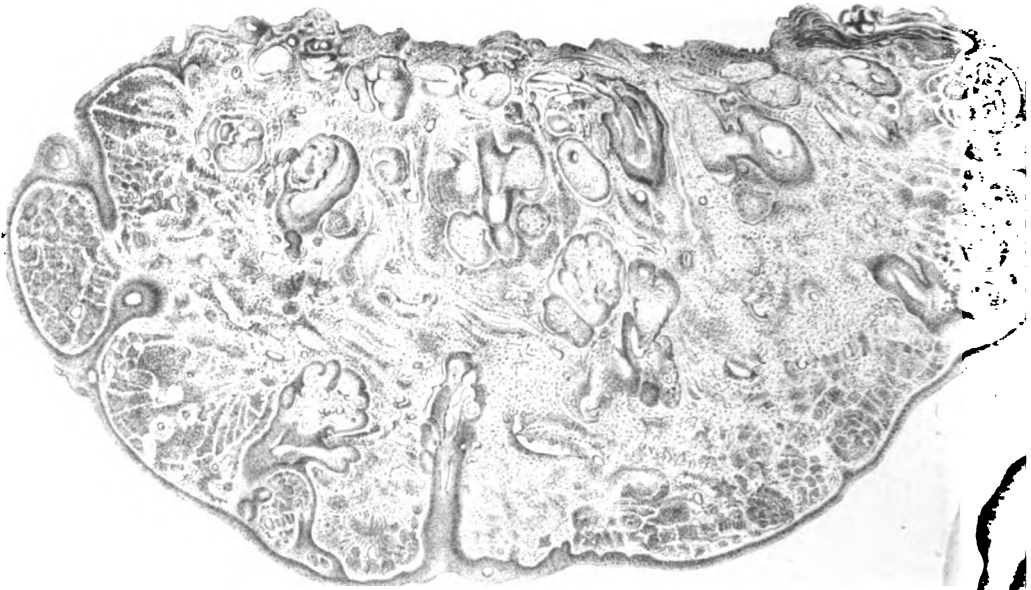


Fig. 1.

Fig. 3.

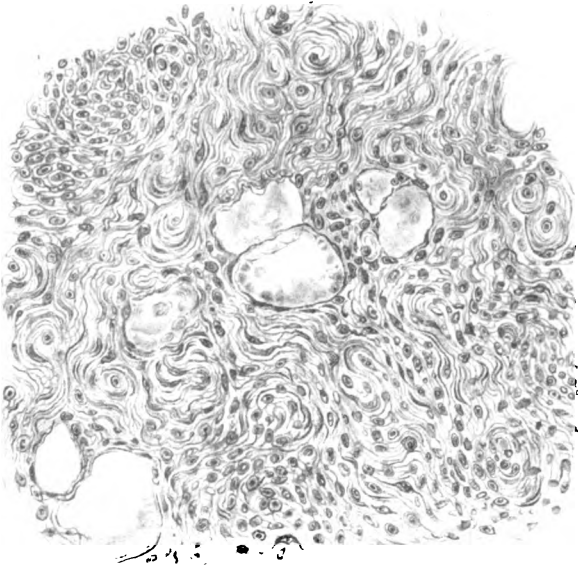


Fig. 4.



Fig. 5.

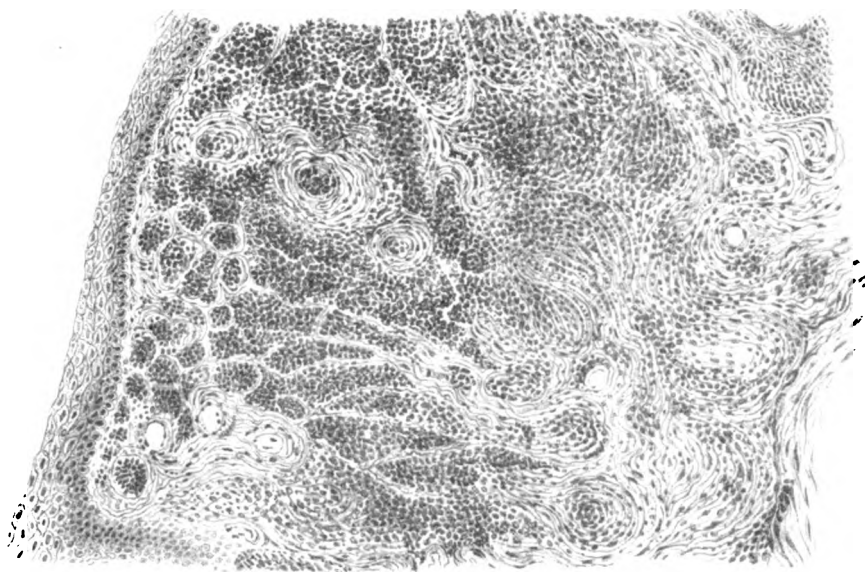


Fig. 6.

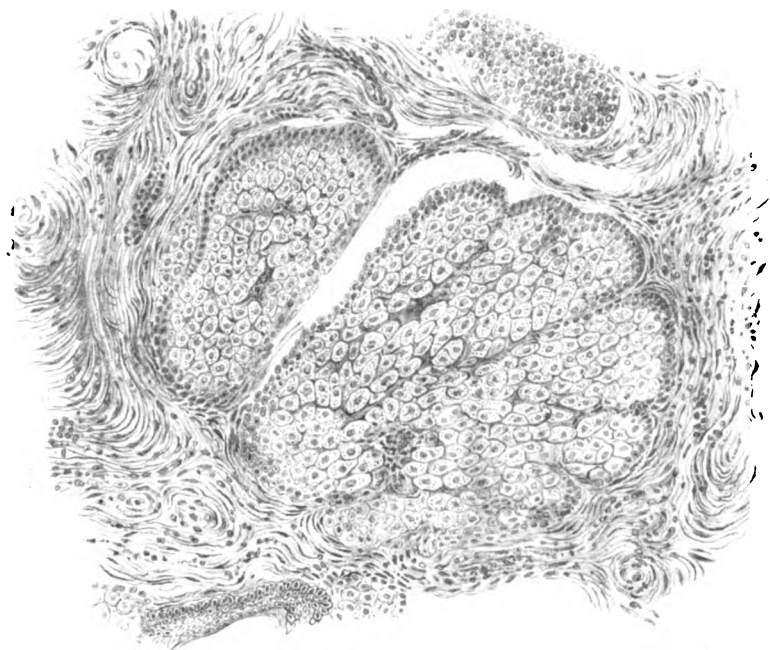


Fig. 1^a

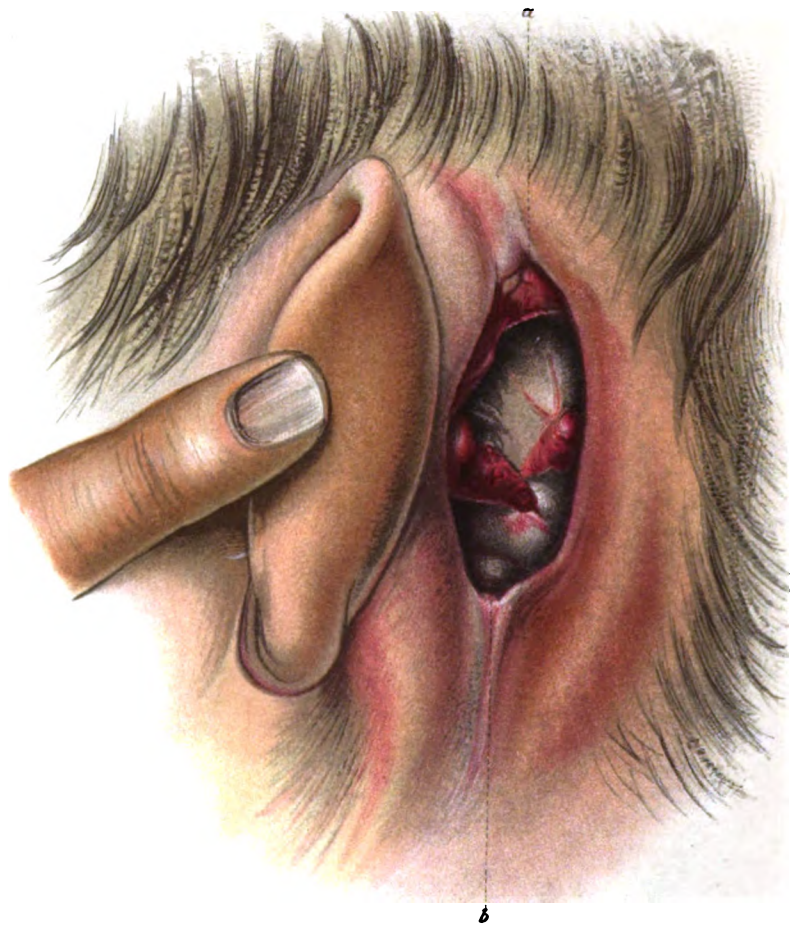


Fig. II.

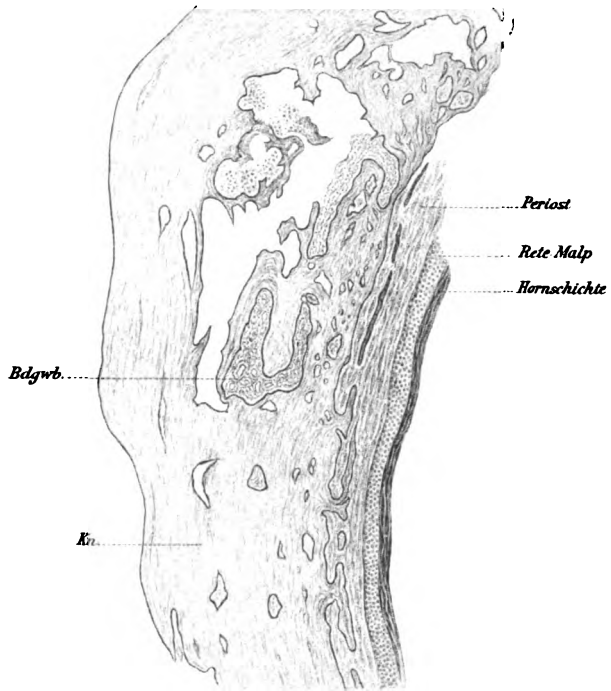


Fig. I b

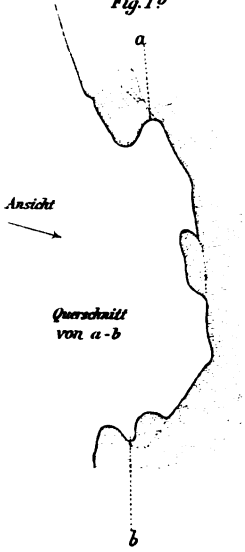


Fig. III.

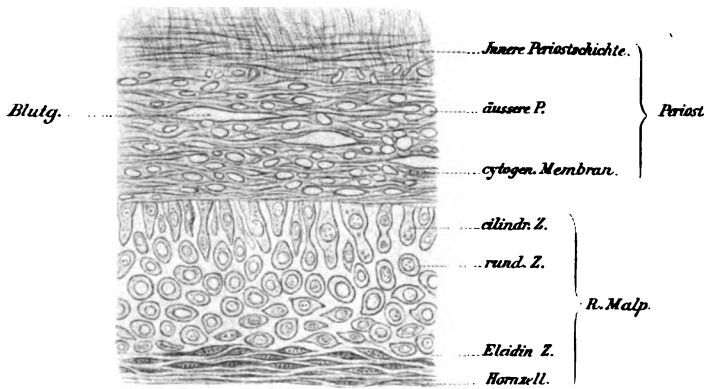
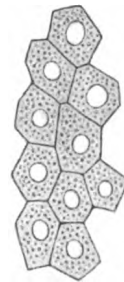


Fig. IV.



ARCHIVES OF OTOLOGY.

CHOLESTEATOMA OF THE EAR.*

BY A. KUHN, OF STRASSBURG.

Translated by Dr. HARRY FRIEDENWALD, of Baltimore.

With Plates III. (Colored) and IV. (Lithographic) of Vol. XXI. of German Edition.

CRUVEILHIER¹ was the first to describe cases of cholesteatoma, naming it "tumeur perlée." The term cholesteatoma was introduced by Johannes Müller,² who recorded eight cases. He believed that this tumor might occur in any part of the human body, and that it was always encapsulated by a thin membrane, which was not composed of cellular elements like the cholesteatoma, but of indistinct fibres. Müller describes the cholesteatoma as a tumor without blood-vessels, which grows like the yolk-cells within the yolk membrane and like the stratified epithelial cells. The cells which have been formed leave the seat of their formation, new cells constantly taking their place; this accounts for their stratified structure.

Cruveilhier regarded the growth as a product of secretion, because he could not find any indication of organization, and called it "tumeur perlée," because of its pearly white lustre. Müller, on the other hand, looked upon it as a pearly white, stratified *fatty tumor*, and therefore gave it the unsuitable name of "*cholesteatoma*," for he considered the *cholesterine* which is found between the layers of the polyhedral cells as essential and characteristic of the tumor, and as the differentiating feature from other fatty tumors (steatomata).

* Read before the Section on Otology at the Tenth International Medical Congress, August 5, 1890.

¹ Bibliography at the end of the paper.

Virchow,¹ basing his observations upon a large number of cases of cholesteatoma (including two occurring in the temporal bone) questions this conception of cholesteatoma, of Müller. According to Virchow the cholesteatoma, which should more properly be called "pearl tumor," or "margaritoma,"¹ is an *epithelial neoplasm*, consisting of concentric lamellæ, made up of polygonal, flat, non-nucleated, epidermoid cells, between which cholesterine crystals lie in greater or less quantities. The pearly gloss is produced, as was already pointed out by Müller, by the interference of light in the finer concentric layers of the polyhedral cells.

Virchow regards the growth, whether occurring in the *pia mater*, in the temporal bone, or in other bones of the skull, as a *heteroplastic* formation, for under normal conditions epidermoid structures are not found in those parts. In this respect it differs from the atheroma, which otherwise resembles it both microscopically and macroscopically, it being likewise made up of concentrically stratified layers of flattened polehedral epidermic cells, with cholesterine crystals between them. Atheromata, however, are never found but in parts where there are sebaceous glands and hair follicles, in which the epidermic pearls develop by simple hyperplasia. In order to consider cholesteatoma an analogous development we would have to suppose, as does Remak,⁴ that epithelial cells became involuted in the *pia mater* or in the temporal bone during an early embryonic period. Virchow regards the heteroplastic development as *analogous* to that of the *epithelial carcinoma*; both develop from mesoblastic tissues.

Cholesteatoma is *most common*, according to Virchow, in the *temporal bone*, especially in the upper and outer portion of the tympanic cavity toward the cells of the mastoid process, in a part where at a very late period solid bone is gradually absorbed to make way for ivory-like bone containing air spaces communicating with the tympanic cavity—a process which is rare in other portions of the system. "It is possible that the development of epidermoid masses has some connection with this process." This hypothesis is, however, not justi-

¹ From *μαργαριτῆ*, a pearl (Craigie).

fiable, inasmuch as these spaces, which develop at a later period of life by the absorption of the bone, exist as well in the normal temporal bone of the child as of the adult. These early smaller or larger cavities are the *recessus epi-tympanicus*, the *aditus ad antrum* which are found more or less developed in every temporal bone, and which are long known to be the favorite seat of cholesteatomata (Bezold). According to Virchow, the tumor is at first entirely enclosed in the bone, and it may remain so; but frequently it distends the bony cavity by its gradual growth, causes absorption of the bone (as an aortic aneurism does of the vertebræ), and finally perforates the bone into the tympanic cavity or the external auditory canal, or on the surface of the mastoid process, or into the middle or posterior cranial fossa, or even into both at the same time. The absorption of the bone may go on unnoticed, causing no marked symptoms. In other cases, however, inflammatory processes arise in the neighborhood, the bone becomes carious, the neoplasm usually becoming disintegrated at the same time. If this inflammatory process extends toward the tympanic cavity or the external auditory canal, perforation of the drum or of the canal occurs, and otorrhœa sets in. Should the extension be toward the cranial cavity, then the farther course will vary according to what part of the *dura mater* has been exposed. If it is, for example, the dural covering of the sigmoid sinus that is touched, sinus phlebitis and thrombosis may develop, with all the symptoms of pyæmia. At other parts of the *dura mater* it may produce meningitis, and even cerebritis.

Virchow describes as *capsule* of the cholesteatoma an exceedingly *fine membrane*, one of the most delicate structures that it is possible to see.

Such are Virchow's views and those of his school * on the nature of cholesteatomata, and they are now universally accepted both by pathologists and surgeons.

Thus Mikulicz * regards cholesteatomata and dermoid cysts as nearly related, and having intermediate forms to which the dermoids of the head belong. Both are embraced by the generic term of dermoid. He ascribes the frequent occurrence of cholesteatomata in the neighborhood of the ear

to the complicated development of the epidermoid structure of the labyrinth. The primitive auditory sac arises as an accumulation of epidermic cells near the posterior cerebral vesicle, which becomes involuted and sinks in deeply; processes may develop and be partially separated. The aqueduct of the vestibule remains as a vestige of its connection with the epiblast.

Küster⁷ also regards cholesteatoma of the ear as a primary tumor, as a congenital neoplasm of the bony middle ear of the same nature as the deep atheroma of the neck, the branchiogenic cystoma, both having their origin in detached involutions of epidermic elements in the region of the first branchial cleft.

Toynbee⁸ was the first otologist to record a case of cholesteatoma (1850). It occurred in a man aged sixty-seven years, who had shown no symptoms of ear trouble during life, was situated in the posterior wall of the auditory canal, and had extended from here into the mastoid cells; it was undoubtedly a cholesteatoma, though Toynbee called it "molluscos tumor," and erroneously considered it as having taken its origin in the sebaceous glands or hair follicles of the external auditory canal.

v. Troeltsch⁹ in 1868 opposed Virchow's theory of the primary and heteroplasmic nature of cholesteatoma of the ear. He described four cases, explaining the epidermic masses *as products from the surface of the chronically inflamed mucous membrane of the middle ear, which are retained where they are formed and thus collect in great masses*. He therefore regarded them as *retention tumors*.

His reasons for regarding them as the products of a diseased mucous membrane and not as peculiar kinds were: 1, the flat arrangement of the cholesteatomatous masses; 2, their connection with the mucous membrane; and 3, the constant *presence of caseous pus* in the centre of the growth. This pus he regarded as the origin of the growth; by exerting gradual pressure upon the walls of the bony cavity—for instance, the *antrum*, the favorite seat both of old caseous masses and of cholesteomata,—it causes the "*formation of cellular products* not only in great

quantity, but changed also in form and kind so that they resemble *stratified epidermis* and appear as pearly plates."

A year later (1869) Nobiling¹⁰ raised the very weighty argument against Troeltsch's view, that the epidermic cells composing cholesteatomata of the ear cannot at all be compared with the epithelium found in the middle or inner ear. While the latter is made up of very small nucleated cells 0.03 *mm* in their longest diameters, and form a pavement epithelium, the former are non-nucleated, and are 0.06–0.09 *mm* in their longest diameters, being thus 2–3 times as large, and resemble the epidermic cells of the auditory canal in size, form, and in other qualities.

Notwithstanding this many otologists still cling to Troeltsch's view, which is incorrect both anatomically and clinically. It fails to explain those rare cases in which cholesteatomata appeared with very acute symptoms and without any preceding otorrhœa. It offers no reason for the fact that cholesteatoma occurs usually in one ear only, though suppurative inflammations of the middle ear frequently affect both ears. Moreover, the central nucleus of pus is wanting in very many cases; the tumors are frequently composed *throughout* of the same pearly epidermic plates, and even when a so-called pus-nucleus is present, it is found to be composed of disintegrated epidermic cells, together with particles of fat and cholesterine crystals and not of caseous pus,—there being no vestiges of either new or old pus cells. Finally this theory does not explain why the cavities of the middle ear containing the cholesteatoma, be they large or small, are provided throughout with a thin, white, glossy lining, (unless the wall has become carious), consisting of a thin layer of connective tissue, which is closely applied to the bone and of four to six layers of cells, which are perfectly analogous to the *rete Malpighii*, and which pass gradually over into the flat polygonal cells of the cholesteatoma. The surface of the cholesteatoma lies in close contact with this membrane, by which it is produced. Irritation by pressure is unnecessary in this production, as is proved by the many cases in which, after removal of the masses, new products soon appeared.

Wendt¹¹ also opposed v. Troeltsch's theory. He described (in 1873) a true cholesteatoma, but believed that these growths are very rarely primary neoplasms. He inclined to the view that cholesteatomata of the middle ear are commonly the *product of a desquamative inflammation of the tympanic mucous membrane*, which when exposed by perforation of the drum after chronic inflammations, may take on the character of the external skin with even a *rete Malpighii*, and, shedding the outermost flattened layers rapidly, may give rise to cholesteatoma. Moreover, Wendt states he has seen a case in which the *rete Malpighii* of the external skin at the edge of a perforation in the drum passed directly over into the newly formed layer in the tympanic cavity. This may explain the production of cholesteatomata, but not the formation of the cutis-lined lining membrane. Besides, the theory requires a more or less extensive perforation of the drum, which is not always found. We have occasionally removed such formations similar to cholesteatoma from the mucous membrane on the promontory, but they were always only thin, lamellated, epithelial scales, and never the thick, concentrically stratified masses of a cholesteatoma. Another argument against Wendt's theory is that the *antrum* and the *aditus ad antrum*, the favorite seats of cholesteatomata, have but very slight communication with external parts, even when Schrapnell's membrane is perforated. Moreover, it is very remarkable that in a great number of cases of perforation of the drum, with exposure of the middle ear, the mucous membrane retains its normal character.

Lucae,¹² struck by the almost constant occurrence of granulations in cases of cholesteatoma, believes that the former stand in a causal relation to the latter. Ponfick observed that in a case of granuloma its periphery consisted of characteristic epidermic cells, which had developed from the granulation-cells by the latter gradually becoming larger and flatter. Lucae therefore believes that many cholesteatomata arise from proliferation and shedding of epidermis from granulations in suppurative inflammation of the middle ear, and that this accumulates in the spaces within the middle ear finally forming a cholesteatoma. This explanation

is also insufficient because it does not account for the membranous capsule.

Both Politzer¹⁸ and Lucae concede that cholesteatoma may also develop as a primary growth. The latter described such a tumor in 1866; it was found in a person who had died from spinal disease and completely filled the middle ear, appearing as a yellowish-white pearly tumor of the size of a cherry. At the same time the drum, though somewhat hazy, did not show any break in its continuity, nor were any signs of inflammation or of suppuration visible in any part of the temporal bone.

Besides this rare and very important observation, Lucae records another case in which a cholesteatoma of the tympanic cavity perforated the upper posterior quadrant of the drum membrane, giving rise to very acute symptoms. The patient, aged forty-four years, was unable to remember any previous trouble in this ear.

Similar cases of cholesteatoma, whose appearance was accompanied by very acute symptoms, and which were not preceded by any affection of the ear, have been recorded by myself,¹⁹ and Schwartz²⁰ also mentions a case with perforation into the auditory canal without previous inflammation or suppuration. Urbantschitsch ("Lehrb. d. Ohrkr.," 1890, p. 288) also observed a case in which the upper posterior quadrant of the imperforate drum was pressed far forward by a large growth arising in the tympanic cavity. After incising the drum it was found that the upper and posterior part of the tympanic cavity was filled with a cholesteatomatous mass. This patient had likewise never had any previous affection of the ear.

Habermann²¹ and Bezold²² have recently published anatomical facts, which are in accordance with the theory of secondary development of cholesteatomata of the ear, and which are the most weighty objections that have until now been raised against Virchow's views. In 1888 Habermann described one case, and in 1889 two further cases, before the *Heidelberger Naturforscher-Versammlung*, which yield unquestionable anatomical proof. In the first case a band-like *strip of epidermis extended from the external sur-*

face of the perforated drum membrane, through the perforation and over the fenestra ovalis to the cholesteatoma situated in the antrum; in the second case the epidermis and the mucous membrane had grown in a similar manner from a perforation in the upper posterior quadrant of the drum into the tympanic cavity and here encapsulated a globular cholesteatoma, which filled up the greater part of the tympanic cavity. The third case gave similar evidence, though much less clearly.

Thus Habermann explains one manner of origin of cholesteatomata, though he considers it possible that they may develop as a purely hyperplastic growth in the middle ear or even as a metaplasia of the tympanic epithelium. Bezold, who recently advanced similar views, observed these growths with exceeding frequency in cases of chronic suppuration with perforation of Schrapnell's membrane, and often too in cases of chronic purulent inflammation of the middle ear in which fistulous openings had appeared in the external auditory canal or on the cortical surface of the mastoid process. In all these cases the development of epidermis can be demonstrated anatomically in the middle ear; here heterologous tumors are of exceedingly rare occurrence—a fact which is not in consonance with the relative frequency of cholesteatoma of the ear. According to Bezold, simple tubal catarrh may cause retraction and perforation of Schrapnell's membrane, and this may lead to extension of the epidermis and to the formation of a cholesteatoma in the *aditus* and the *antrum*.

The structure of the fine membranous capsule seems to me to be of the greatest importance in the mode of origin of cholesteatomata. I have recently had an opportunity of removing this membrane, together with the bone, from a living patient, and of examining it microscopically.

C. S., fifty-one years of age, had always enjoyed good health. Until a year ago his hearing had been very good in both ears,—there had never been a discharge. About a year ago he first noticed a pretty intense tinnitus, which came on frequently, especially after violent physical exercise, and at these times the hearing of this ear diminished. Later on attacks of dizziness would

accompany the tinnitus and recur about every fortnight, getting more severe with each attack; his vision would become much impaired, he would stagger and would have to hold on to something to prevent himself from falling. When he pressed his finger against the left mastoid process the dizziness would increase considerably. In January he had had influenza without affecting the auditory apparatus.

His condition remained unchanged until March. On the 19th he took a bad cold, from long exposure in wind and snow; in the evening of the same day severe pain set in in the deeper parts of the left ear, which increased during the following night; on the next day he was unable to work because of great pain and fever. Two days later a purulent discharge appeared in the left external auditory canal, but the pain continued. On the fourth day the skin covering the mastoid process became swollen; the fever rose, and the discharge was very abundant and exceedingly offensive. On the sixth day the side of the neck became red and swollen. On the eleventh day the patient was admitted into the clinic.

March 30, 1890.—Pain great; temp. 39.5° C. The right ear is normal. There is a profuse discharge of thin, very offensive, greenish pus, which escapes through a fistula situated about 1 cm from the drum in the protruding posterior wall of the auditory canal. Only the anterior lower quadrant of the drum can be seen, and this is covered with smeary pus. On removing this we exposed a small slit-like perforation in the anterior and inferior part of the drum, through which the patient is able to force a small quantity of pus, together with air. The mastoid process is red and swollen; somewhat behind the upper border of the auricle there is a soft spot with deep, hard edge (1 cm in diam.), which presents deep fluctuation. The skin covering the tip of the process is also red and swollen, and below this there is a hard sausage-like infiltration of the deeper parts of the neck beneath the sterno-cleido-mastoid muscle. On pressing on the spot on the mastoid where fluctuation is felt, pus is forced out in great quantities. This contains dirty-yellow lumps of the size of a pea or a bean, which the microscope afterwards reveals to be pieces of a cholesteatoma. The hearing of the right ear is normal. For the left whispered words and Politzer's acoumeter = 0. Weber's experiment shows increase of the sound in the left ear. There is entire loss of air-conduction.

Operation on the following day. After incising the densely infiltrated skin, a large opening was found in the upper part of the process. The edges were carious and rough and covered with some discolored granulations. Offensive greenish pus escaped through this opening. On attempting to use chisel the whole outer wall of the process down to the tip broke in and was removed with the forceps.

It was then evident that the whole of the process was filled with a white, glossy, dry, cholesteatomatous mass, which broke into many pieces in its removal; the upper anterior parts were discolored and had undergone purulent disintegration; the other parts, including those in the centre, were pretty dry and white. The whole mass was at least of the size of a large hen's egg. The only part of the mastoid process which remained was the very tip. The cavity extended forward, laying the articulation of the inferior maxillary bone perfectly bare; the lower and the posterior walls of the auditory canal had disappeared; the inner plate of the process was also wanting, exposing the uninjured dural covering of the anterior inferior segment of the cerebellum, which protruded several *cm* into the cavity and showed strong pulsation. Pieces of cholesteatoma were removed from the *dura mater*; the latter was of a dull-grayish color, appeared to be considerably thickened, but was not inflamed or injured at any point.

The cavity was washed out with a 1:4000 sublimate solution, the fluid escaping through the fistula in the auditory canal. Dressing of iodoform gauze. Hemorrhage was moderate. In the evening the temperature had fallen to 38.5° C., remained so for two days and then became normal and remained so. The intense pain of which he had complained before the operation disappeared entirely, but whenever the dressing was changed during the first three weeks he would regularly have attacks of dizziness or even of fainting. During this period he also suffered with persistent insomnia, which could only be remedied by subcutaneous injections of morphine. After the first three weeks had passed he improved rapidly. The large cavity discharged profusely for many weeks, and it was not before the end of July that the patient could be discharged.

At this time the cavity had diminished to almost half its size. The movements of the jaw were still visible, but were much less evident than at first, for the articular surface was covered with dense and strong connective tissue. The pulsation of the cere-

bellum could still be seen slightly. The *dura mater* was very much thickened and covered by a glossy white membrane, which likewise lined the whole interior of the cavity. Suppuration had ceased almost entirely. Iodoform gauze placed in lightly, and a plate of hard rubber externally, protected the cavity.

The external auditory canal was of normal calibre and perfectly dry. The fistula had closed. The perforation in the anterior inferior quadrant of the drum had closed a few weeks after the operation and remained so. The drum membrane itself was of a grayish-red color without lustre and thickened. No cicatrices or perforations were visible. Schrapnell's membrane was normal. The hearing distance of the left ear for whispered words was 3 *cm* (July 27th).

The tumor that was removed had the characteristic pearly-white gloss and was composed of large polyhedral epidermic cells without nuclei. Disintegrated matter was found only in the upper anterior portion; in the centre even cholesterine crystals were entirely wanting.

The piece of bone that was removed was irregularly quadrilateral, about 3 *cm* square and 2-3 *mm* thick. Its inner surface was covered with a dense white and very glossy membrane. Two small pieces were taken from the periphery and decalcified.

Their *microscopical examination* shows that the bone contains small and large spaces (Fig. 2), which are partially filled up by dense connective tissue. The periosteum, which is closely attached to the bone, is made up of two equally thick membranes, a periosteal membrane, and an epidermic membrane (Figs. 2 and 3). The former consists of three layers; the two nearest the bone are periosteum proper, the third has the character of a cytogenic membrane. The layer nearest to the bone has scarcely any blood-vessels, and is characterized by the great network of elastic fibres of which many bundles dip down vertically into the bone (Sharpey's bundles) (Fig. 3); there are also a few scattered round or flattened cells to be seen.

The second periosteal layer is intimately connected with the former. It contains many blood-vessels, and consists of bundles of connective tissue woven together in various directions, but having a somewhat parallel course; the vertical fibres mentioned above are not to be found in this layer.

The third, the cytogenic membrane is closely attached on the one side to the second periosteal layer and on the other to the

epidermic membrane. It consists of parallel fibres with many round cells, which form the characteristic feature of this layer.

The epidermic membrane is composed of the same elements as the outer layers of the skin, the *rete Malpighii*, and the horny layer. The former is made up of several layers of closely attached cells with granular protoplasm and a light round nucleus (Fig. 3); those lying upon the cytogenic membrane have a lengthened cylindrical form; upon this there are three to four layers of round prickly cells; finally there is a single or a double layer of lengthened cells which take on an intense color when treated with carmine (Eleidine cells, *stratum lucidum*).

The horny layer is composed of light homogeneous cells, the inner layers of which still show a large round light nucleus, which disappears toward the outer layers.

REMARKS.

The question in this case is whether the cholesteatomatous growth was a "true neoplasm," or whether it had its origin in epidermoid tissue of the drum membrane, or the external auditory canal, which had extended into the tympanic cavity, or the cells of the mastoid process, and then proliferated.

The perforation in the drum was situated in front and below, and was therefore very distant from the seat of the growth; it is improbable that there was any connection. The opening was, moreover, only as large as a pin's head at most, and very little pus escaped through it, showing that it was not in direct communication with the main lesion. This makes it appear improbable that epidermis should have extended in from the drum. It is equally improbable that it had grown in from the fistulous opening, situated in the anterior wall of the mastoid process. This would have been possible only after profuse otorrhœa of long duration, for without it perforation of both bone and skin seems impossible. The patient, however, stated positively that no pus had ever been discharged from the ear before the 19th of March, or ten days before the operation, that he had never had any affection of the ear even in his youth, and that he had always had good hearing in that ear until about a year before.

The clinical symptoms, moreover, favor the view that this was a case of "true cholesteatoma," that it was a tumor which originated *primarily* in the mastoid process, and which had during many months and perhaps years grown to its tremendous dimensions; the symptoms which appeared during the last year (tinnitus, dizziness, deafness) were due to erosion of external portions of the ear and to pressure on the cerebellum. Exposure on the 19th of March caused the acute symptoms of the inflammation and of the disintegration of the tumor, which had then extended to the posterior wall of the auditory canal.

The presence of a membrane lining the bony cavity is not proof of the primary origin of the tumor, for it may have been due to the pressure of the tumor upon the periosteum and the bone. At the same time, we have confirmed the observations of pathologists as to its existence.

A great number of valuable clinical observations have been published by Moos, Schwartze, Küpper, Kirk, Dunkanson, Kipp, Steinbrügge, Hessler, Katz, Schmidt, Miehle, and others, which have increased our knowledge of the symptomatology and the complications of cholesteatomata, and have even added to our therapeutic measures, but they do not bear upon the question we have discussed—the anatomy and the origin of the tumor,—for they all agree with one or another of the older theories which we have had to discard.

Viewing the question from all sides, it seems at present to be reduced to one of two possibilities. Cholesteatoma of the temporal bone is either a TRUE HETEROPLASTIC NEOPLASM, as Virchow believes it to be in all cases, or it may also develop and perhaps IN MANY CASES, in the course of chronic suppuration of the middle ear, from epidermis which has grown into the tympanic spaces from the perforated drum or the external auditory canal, and which has slowly and continually kept shedding its horny layer, thus forming the stratified cholesteatomatous mass.

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Description of Plates.

FIG. 1.—*a* and *b* (natural size) show cavity in the mastoid process fourteen days before the patient was discharged. The depth can be seen in the cross-section figured in 1 *b*. At a few places granulations are still visible on the white-lining membrane.

FIG. 2.—Cross-section. Bone showing large and small spaces, partly filled by connective tissue. Periosteum; *rete Malpighii*; horny layer. Hartn. $\frac{3}{1}$.

FIG. 3.—Cross-section of detached periosteum and capsule, with some remaining cholesteatomatous particles. Hartn. $\frac{3}{vii}$.

FIG. 4.—Polygonal cells, with nuclei from the horny layer of Fig. 3. Hartn. $\frac{3}{vii}$.

THE TREATMENT OF CHOLESTEATOMA OF THE MIDDLE EAR.¹

BY PROF. FR. BEZOLD, OF MUNICH.

Translated by CHARLES H. MAY, M.D., New York.

THE following table represents a survey of the results of therapeutics in cases which occurred in my own practice:

Form of Disease of Middle Ear.	Otorrhea ceased.	Otorrhea persisted.	Seen but once or but seldom.	Result unknown after continued treatment.	Came under observation as dry perforations.	Died.
Perforation of Schrapnell's membrane.	{ 37. 50.0 %	{ 6. 8.1 %	{ 16. 21.6 %	{ 10. 13.5 %	{ 4. 5.4 %	{ 1. 1.4 %
Cholesteatoma.	{ 25. 43.9 %	{ 12. 21.1 %	{ 11. 19.3 %	{ 6. 10.5 %	{ 3. 5.3 %	

The only case of death occurred in a patient who had meningitis when brought to the hospital, and who died two days after admission, opening into the antrum having been attempted.

According to this table, the results in general do not seem to have been more unfavorable than those attending the treatment of simple chronic purulent otitis complicated with granulations.

There is, however, a great difference in the *duration* of

¹ From a paper read before the Otological Section of the Tenth International Medical Congress, held at Berlin, August, 1890.

the affection just mentioned as compared to that of the two forms we are considering. We are accustomed to see a return of the trouble in a fraction of the former cases; but in the latter, this is the rule; and in the cases put down in the table as cured, I would not want to assert that more than a majority will remain cured.

A considerable number will remain cured. If the cavity is rendered free by a large opening into the wall of the canal or of the mastoid process, not only does suppuration cease but also all hyper-production of epidermis; the lining of the cavity then resembles the outer layer of the skin and all accumulation of secretion ceases.

In forty-seven cases of cholesteatoma such a result occurred

					8 times between the ages of 2 and 9 months.
4	"	at	"	age	" 1 year,
twice	"	"	"	"	" 3 years,
once	"	"	"	"	" 5 "
and	once	"	"	"	" 9 "

In the first case published by me,¹ this cessation in the production of epidermis has now been observed thirteen years.

However, such an absolute cure, especially when perforation of Schrapnell's membrane has occurred, is the exception and not the rule; the majority of cases require looking after for many years or even throughout the entire course of life, in order to prevent a reaccumulation of epidermis and its consequences.

Therapy has gradually become developed and completed within the last decade, keeping pace with our knowledge of this disease in general; difficulties in treatment increase proportionately as the inaccessibility becomes greater than in other purulent affections of the middle ear.

More than half the cases are complicated by polypoid granulations, usually exposed by pressure from the cholesteatomatous masses which act as foreign bodies. Only a portion of the granulations is found in the canal; the

¹ *Archiv f. Ohrenheilk.*, Bd. xiii., S. 31. (Fall II.)

greater part is found at the margin of the perforation, especially where this is formed by bone, in the cavity, around the ossicles, etc.

On this account it is frequently impossible to remove all the granulations with the snare. In seven cases of perforation of Schrapnell's membrane I succeeded in exposing and tearing off granulations as large as peas, which had previously been hidden, by a strong, direct injection into the cavity by the use of the tympanic tube. In addition we may use the sharp spoon of Wolf or strong curettes, etc., which instruments also serve to scrape the carious bone.

After years of observation we notice the gradual disappearance of these bony margins often enough; if the opening be of sufficient size and the contents be removed, the production of epidermis generally ceases. This fact furnishes us with a guide to treatment.

In most of the cases it was inflammatory manifestations in the mastoid region, but in a few it was an obstinate persistence of fetid otorrhœa, which induced me to open the mastoid antrum—in three cases of perforation of Schrapnell's membrane and in the nine cases of cholesteatoma. In two of these cases it was necessary to make three openings in the course of the year; in one case four repeated openings were necessary. *The previous perforation canal was found in each case beneath the soft parts,¹ and the masses of epidermis had in part proceeded outward into the canal underneath the soft parts.* Even a healed perforation canal, therefore, serves as an escape for the pressure from an aggregation of masses of cholesteatoma; this would at least be sufficient to prevent this pressure from being exerted towards the cavity of the brain. Only in a single case, the fatal one, did we fail to reach the antrum; the canal, which ran directly under the antrum, terminated in a blind extremity in the temporal bone, as shown by the autopsy. In all other cases the antrum was reached, and generally large masses of concentrically arranged epidermis, of cheesy matter, and of granulation tissue, could be removed. In a number of times the

¹ Ferrer has observed this same occurrence; these ARCH., vol. xvii. (1888), p. 317; cf. *Zeitschr. f. Ohrenheilk.*, Bd. xx., S. 245.

main part of the mass became dislodged in one piece as a result of possible injection during the operation.

Accidental injuries, such as we would almost necessarily expect in a number of the cases when we examine the relations of the sigmoid sinus and middle fossa, did not occur.

Later on, after the process has lasted many years, we find mastoid processes which are almost completely sclerosed, containing often no other space except the antrum, more or less dilated; this absence of cell spaces is, however, the result of long-continued inflammatory and irritative processes.

The treatment of both conditions has been furthered by the introduction of the operation of excision of malleus and incus as recommended for cholesteatoma by Kessel as early as 1879, and as employed with special frequency by the Schwartze school since then. By operating in this manner we are often able to expose the cavity sufficiently from the auditory canal.

In the 112 cases the malleus, generally carious, was extracted 10 times—5 times in cases of perforation of Schrapnell's membrane and 5 times in cases of cholesteatoma. This operation was only done in cases in which the whisper was heard at less than $1\frac{1}{2}$ metres. It was probably accidental that the incus was not included in any of these 10 cases. In 4 cases it was necessary to open the antrum at the same time.

Regarding the rest of treatment, it seems absolutely necessary to me to use Hartmann's or some other form of tympanic syringe in all cases, not only therapeutically, but also for the purpose of diagnosing the existence of cholesteatomatous masses. It is only with the assistance of a direct stream, led into the cavity by a short route, that we are able to loosen and remove the scales of epidermis adherent to the widely dilated walls of the cavity. The injection consisted of a four-per-cent. solution of boric acid. When preliminary softening seemed necessary, liquor ammoniæ, considerably diluted, was used.

When the size of the cavity admitted, I used a sharply bent tympanic tube of large calibre for direct insufflation of boric acid; this method I have been using since 1877, and

with increasing practice I have found it serviceable in an increasing number of cases. In order that this method of treatment may be correctly applied, it is necessary that the entire cavity be dried carefully previous to the insufflation; this can best be done by cotton wound upon a holder, the latter being bent as required. Gomperz and Siebenmann also have recently reported favorably upon the insufflation method. In a series of cases, among which were some in which the antrum had been opened and the malleus extracted, several insufflations into the cavity stopped the suppuration and produced a lasting cure of the fetor; this method of treatment grew constantly in favor, so that now I employ it in every possible case. In the rare cases in which boric acid produces eczema of the auditory canal I use iodoform.

We appreciate the full value of one of our oldest therapeutic resources when we consider the probability of an etiological connection between catarrh of the tubes and perforation of Schrapnell's membrane and cholesteatomatous formations. The certain control of catarrh of the tubes in children, which Politzerization and the removal of adenoid vegetations accomplish, may also be regarded as prophylactic measures against the development of many a case of cholesteatoma. In this way we may accomplish the greatest triumph—one to which medicine in general aspires,—to cure, in their earliest stages, a series of important ear diseases which, if left alone, are frequently followed by disastrous consequences on the general system.

A CASE OF DEAF-MUTISM CAUSED BY MEASLES, WITH POST-MORTEM EXAMINATION.

BY DR. HOLGER MYGIND, COPENHAGEN, DENMARK.

The deaf-mute C. F. V. J. was born October 31, 1863, in the town of Nyborg, Denmark. His parents, who are both alive, were quite healthy. There is no consanguinity between them, neither are there nor have there been any cases of deaf-mutism, deafness, or any other disease of the hearing organ amongst their relations, nor any case of idiocy, cerebral disease, or any other disease which experience has proved to be of any importance in the etiology of deaf-mutism. The parents have always lived under tolerably good conditions, and the father is not intemperate. There are altogether five children by this marriage ; of these the deaf-mute in question is the eldest ; the other children, four daughters, are all healthy, and their hearing is normal.

Carl J. was born at time by natural labor. The father was then twenty-nine, the mother twenty-two years of age. He was perfectly healthy during the first years of infancy, and developed well ; the parents are perfectly certain that his hearing was then normal, and that he began to speak like other children when about one year old. In one of the early spring months in the year 1865, when he was a little over one and one-fourth years of age, while the parents had their place of residence in the town of Vejle, the child was attacked by a disease which the medical attendant declared to be measles. The child was but slightly attacked, and kept his bed a few days only ; but the parents soon discovered that the child's hearing had meanwhile totally disappeared, never to be recovered ; there appeared at the same

time an abundant purulent discharge from both ears. They cannot remember if the child had any earache or other symptoms from the ear; they did not notice any dizziness or derangement of equilibrium when the child walked. They know for certain that there were no cerebral symptoms present, such as stupor, convulsions, squinting, etc., nor any spinal symptoms.

Carl J. soon left off speaking, but was otherwise after recovery perfectly healthy, except that the discharge from the ears continued; it was sometimes very abundant, while at other periods it was but slight, or did not even appear at all. It was frequently accompanied by a foul smell. After the child had been sent to the Deaf and Dumb Institution, the discharge discontinued and never appeared again. In the years subsequent to the appearance of the deafness, the child thrived very well, never having any ailment of importance. His mental development was also satisfactory.

In 1872 the deaf and dumb child was sent to the Royal Deaf and Dumb Institution in Copenhagen, and there it was noticed that he had no faculty whatever of hearing or speaking. He was instructed by means of dactylology. The register of the institution does not contain any information as to the deaf-mute beyond what is stated above.

In 1879 the deaf-mute left the institution after having been confirmed there, and became apprenticed to a joiner. He showed, however, very little inclination to work, and his parents had therefore to take him home and maintain him until shortly before his death. Occasionally he left his home for shorter periods and kept bad company. He enjoyed good health and never kept his bed, but complained now and then of severe headache. By degrees he became more and more addicted to drink, and grew very irritable. Three weeks before his death he left his home, being dissatisfied with it and with his relatives' appeal to him to work, and the parents did not know anything about his death and intended interment until I had found out—after several days of close search—who they were, and had informed them of what had happened to their son.

On the 26th of January, this year, the deaf-mute was found by the police in one of the streets of Copenhagen, lying in a helpless state. He was conveyed to the Third Department of the Copenhagen Commune Hospital (Prof. Trier), where the medical officer in attendance found him in an almost dying state. The deaf-mute was, however, able to write his name and the address

of an ill-reputed lodging-house, where he had spent his last nights, and also that during the last three days he had had pains in the chest, cough and vomiting. By the medical examination there were found signs of a croupous pneumonia of the inferior lobe of the right lung. The deaf-mute expired the next morning at six o'clock.

The post-mortem examination was performed the 28th of January, by Dr. Borch, and revealed a genuine pneumonia of the inferior lobe of the right lung, but otherwise nothing abnormal in the thoracical and abdominal cavities.

AUTOPSY.

Both temporal bones were examined by me while fresh, on the very day of the post-mortem examination and the next, with the following result :

Right Temporal Bone.

The right temporal bone does not show any anomaly as far as shape and size are concerned ; the mastoid process is, however, a little less developed than normal. The petrous portion of the bone shows fully developed cerebral depressions. Eminentia arcuata very prominent. The external openings of the aquæductus cochleæ et vestibuli are present and of normal diameter. A fine probe introduced into the aquæductus cochleæ shows that this canal is impermeable a few *mm* from the external opening, while the aquæductus vestibuli allows the probe to pass through in its whole length.

The *mastoid process* is entirely built of hard, sclerotic, bony tissue, and there is no trace whatever of any cavity.

The *meatus auditorius externus* is of normal shape, length, and diameter. The *membrana tympani* is present in its whole extension, and movable by means of exhaustion and compression of the air of the meatus. The portion of the membrane situated in front of the malleus is of a whitish, tendinous appearance, and is not transparent, even after the removal of the dermoid layer ; the greater portion of the part of the membrane situated behind the manubrium is occupied by a large calcareous deposit (5 *mm* high and 3 *mm* broad), which is rather thick, especially in its centre, and is situated in the middle layer of the membrane. While the outer layer of the membrane is easily detached from the deposit,

the mucous layer adheres strongly to it. The malleus is present ; its manubrium is drawn considerably inwards and backwards, and the processus brevis is very prominent, without, however, producing any folds of the membrane. Schrapnell's membrane is normal.

The *tympanic cavity* is large, lined all over with a fine, thin, and pale mucous membrane, which nowhere forms any abnormal folds or adhesions. The opening to the mastoid cavity is obliterated, while that of the Eustachian tube is normal. All the ossicula auditus are present, and of a natural shape and size, and all their articulations are movable. The articulation between the base of the stapes and the fenestra ovalis is of normal aspect, but only a very slight movement is possible in this joint. The fenestra rotunda does not exist at all, the part of the inner wall of the tympanum situated behind the promontory forming a surface where there is not even a trace of fossula fenestræ rotundæ. This whole surface is very uneven, having numerous larger and smaller prominences, of which some are pointed and thorny, while others are nodulated and warty, the whole assuming the appearance of stalactite formations. The eminentia pyramidalis is not present ; its place is indicated by a small conic protuberance on the posterior wall of the tympanum. No trace of the musculus tensor tympani or stapedis is to be found.

The *semicircular canals* are all present, and of natural length and curvature ; their diameter is $1\frac{1}{2}$ mm. They are all permeable in their whole length, and filled by a clear watery fluid of exactly the same appearance as the normal aquæductus labyrinthi. There is no trace of the membranous contents of the canals, the walls of which are perfectly smooth.

The *vestibule* is of natural shape and size, the cresta vestibuli and the eminentia pyramidalis being, however, less prominent than usual. This cavity does not either contain any membranous formation, but is filled by the same clear fluid as the semicircular canals. The base of the stapes is normal. The internal opening of the aquæductus vestibuli is rather wide. The opening to the scala vestibuli is normal.

The *cochlea* is that portion of the labyrinth which shows the most prominent anomalies, the greater part of its cavity being replaced by hard, white, sclerotic bone tissue, which, however, only indistinctly shows the normal outlines of the cochlea passing without any distinct boundary into the adjacent spongy bone of

the petrous portion. There is no trace of the modiolus, nor of the lamina spiralis. The first half of the first turn is all that is left of the normal cavities of the cochlea, forming a canal 15 mm long and 2½ mm wide, which, according to its position and size, represents scala vestibuli as well as scala tympani, without, however, being in communication with the tympanum through the fenestra rotunda. The remaining part of the cavity of the cochlea is filled with the same clear fluid as the semicircular canals and the vestibule. No trace of any membranous formation is to be found in cochlea, the cavity described being lined with a thin layer of periosteum, which adheres to the adjacent bone.

The *meatus auditorius internus* is of natural diameter, and contains the two nerves—the auditory and the facial. This latter takes its course through the Fallopian canal. The auditory nerve branches off in its two terminal branches—*nervus vestibuli* and *nervus cochleæ*—the terminal network of which ends in the bone itself, which forms the bottom of the meatus, and which looks natural except that the outlines of the tractus spiralis foraminulentus are not distinct, and that all the fine canals of the cribriform lamina do not lead into the labyrinth.

Left Temporal Bone.

This exhibits the same aspect as the right temporal bone in every respect.

The *meatus auditorius externus* is of normal shape and diameter. Its entire osseous portion is filled by a whitish, gelatinous mass formed by aggregated epithelial masses, after the removal of which the membrana tympani is seen to be almost entirely wanting.

The *tympanic cavity* is filled with the same gelatinous masses which were found in the meatus; after their removal all the ossicula auditus are seen to be present, being of normal shape and size, and movable in their articulations. Malleus adheres with its processus brevis and manubrium to a small rest of the tympanic membrane. The base of the stapes is only very slightly movable in the fenestra ovalis. The left tympanum is otherwise quite like the right; especially there is no trace of the fenestra rotunda, and the same stalactite formations are found on the internal wall of the cavity.

The *semicircular canals* and the *vestibule* are as on the right side.

The *cochlea* only differs from the right one inasmuch as the remaining part of the first turning is somewhat smaller.

The Auditory Nerves.

The nerve of either side is of natural volume and aspect, and its consistency is also normal. A microscopical examination (Dr. Borch) does not reveal any pathological changes, especially no signs of atrophy.

The Brain.

The meninges are filled with blood to a moderate extent; the pia and arachnoidea are easily detached from the surface of the brain. The meninges present no abnormality. There is no visible asymmetry of the two hemispheres, except that the posterior and inferior part of the frontal convolutions of the left side are slightly flattened, while the corresponding parts of the right side show more numerous and more branched sulci cerebrales. The examination of the brain reveals no other abnormality.

The Larynx

is normal.

The case of deaf-mutism described above is of interest inasmuch as post-mortem examinations of deaf-mutes are rarely reported in connection with complete information as to the origin of the pathological conditions which have led to deaf-mutism. It has therefore frequently been difficult to ascertain whether the morbid changes found in many cases of post-mortem examinations of deaf-mutes have been congenital or acquired—a fact I have pointed out in a previous paper.¹ The case is also of considerable interest because there only exist two previously reported cases of post-mortem examinations of deaf-mutes where measles were the cause of the deafness. The specimens of these two cases are in the pathological collection of the Copenhagen University, and are briefly mentioned by me in the paper quoted

¹ Mygind: "Uebersicht über die pathologisch-anatomischen Veränderungen der Gehörorgane Taubstummer." *Arch. f. Ohrenheilk*, Bd. xxx., pp. 76-118.

above.¹ In one of these cases the cochlea was found in a condition similar to that of the present case, its normal cavity being perfectly replaced by bony substance, the aspect of which was exactly like that of the case reported here.

It is generally admitted that measles play some rôle in the etiology of deaf-mutism, although its importance in this respect is not nearly so considerable as that of scarlet-fever. Thus, Mygge² found in 1879, by investigations in the Royal Copenhagen Deaf and Dumb Institution, that none of the inmates admitted up to that time were reported as having become deaf through measles.³ L. W. Salomonsen⁴ found, however, some years later, that 11 out of 197 inmates with acquired deafness admitted to the said institution, *i.e.*, 5.6 per cent., had become deaf through measles. Investigations based upon the returns of the deaf-mutes of Denmark have proved that 5.3 per cent. of the deaf-mutes with acquired deafness had contracted their deafness from measles.⁵ On the other hand, Itard considered measles to be a frequent cause of complete deafness,⁶ a statement which is corroborated by F. L. Meissner.⁷ It is to be expected meanwhile that the importance of any zymotic disease as to the etiology of deaf-mutism varies considerably in different countries and at different times—a fact also proved by the synopsis made by A. Hartmann,⁸ according to which the relative number of deaf-mutes whose deafness was acquired by measles varied in the different deaf and dumb institutions from 0.0 per cent. (Institutions of Meersburg and Gerlachsheim) to 46.9 per cent. of the inmates

¹ *L. c.*, p. 92, Nos. 36 and 40.

² Mygge on "Marriages of Near Kin, Considered Especially in Regard to their Significance for the Etiology of Deaf-Mutism." Copenhagen, 1879, p. 266. (This title is translated from the Danish.)

³ Mygind: "Uebersicht über die pathologisch-anatomischen Veränderungen der Gehörorgane Taubstummer." *Arch. f. Ohrenheilk.*, Bd. xxx., pp. 76-118.

⁴ L. W. Salomonsen: "Remarques sur l'étiologie de la surdi-mutité et sur l'enseignement des sourds-muets, principalement en Danemarck." *Compte-rendu du congrès périodique international des sciences médicales*, viii. session, Copenhague, tome iv., section d'otologie, p. 45.

⁵ Investigations by the author not published yet.

⁶ Itard: "Traité des maladies de l'oreille et de l'audition," tome ii., p. 380.

⁷ F. L. Meissner: "Taubstummheit und Taubstummtenbildung," p. 158.

⁸ A. Hartmann: "Taubstummheit und Taubstummtenbildung," p. 76.

with acquired deafness (Regierungsbezirk Cöln). Amongst later authors Hedinger¹ found 1.0 per cent., Wilhelmi² 4.4, H. Schmaltz³ 7.0, and Uchermann⁴ (in Norway), 2.5 per cent. of the individuals with acquired deafness deaf through measles.

The history of the present case, combined with the morbid changes found by the post-mortem examination, makes it beyond doubt that the pathological process of the hearing organs of the deceased deaf-mute have been of the following character and have taken the following course :

During the attack of measles a bilateral inflammation of the middle ear has set in—probably secondary to an acute catarrh of the naso-pharynx. The former existence of such an inflammation is proved by the inflammatory residua found by the post-mortem examination of the tympanum, viz., (1) on the external wall (the membrane) the left membrana tympani almost entirely wanting, while the right one was the seat of a large calcareous deposit of such a considerable extent and thickness that it can hardly have been caused by anything but a purulent inflammatory process, the existence of which on either side is also proved by the existence of a bilateral purulent discharge. (2) Further, on the posterior wall of the tympanum the aditus ad antrum mastoideum was found closed, and the mastoid process sclerosed—a proof that also this portion of the middle ear has been involved in the inflammation. (3) Further, the internal wall of the tympanum was the seat of the stalactitic productions mentioned above, which exhibited strong evidence of a severe inflammation of the osseous structure of the tympanum. The osseous plate replacing the membrana tympani secundaria of the foramen rotundum must have had the same origin. This latter pathological change is found in

¹ Hedinger : "Die Taubstummen und die Taubstummenanstalten nach seinen eigenen Untersuchungen in den Instituten des Königreichs Württemberg und des Grossherzogthums Baden," p. 123.

² Wilhelmi, Felix : "Taubstummenstatistik der Provinz Pommern und des Regierungsbezirkes Erfurt, herausgegeben von A. Hartmann." *Zeitschrift f. Ohrenheilk.*, Bd. ix., p. 195.

³ H. Schmaltz : "Die Taubstummen im Königreich Sachsen," p. 149.

⁴ Uchermann : "Deaf-Mutism, Especially in Norway." (Title translated.) *Norsk Magazin for Lægevidenskaben*, 1890, No. 12, p. 13.

three previous cases of acquired deaf-mutism (Bochdalek,¹ H. Schwartz,² and Politzer),³ and in several cases where the cause of the deafness was unknown. (4) Finally, the normal muscles of the tympanic cavity were missing on either side—a circumstance which, together with the facts mentioned above *sub* 1–3, tends to prove that the middle ear has been at some time the seat of an inflammation, which has been especially intense and destructive in the inferior part of the tympanic cavity, and mostly in the inner portion of this, while the upper part, the so-called attic, has been but little involved in the severe inflammatory process. These latter circumstances seem also to bear strong evidence that the inflammation has reached the middle ear through the Eustachian tube.

The further progress of the pathological process has then undoubtedly been as follows: The inflammation has been propagated from the middle ear into the labyrinth through the fenestra rotunda, and has here especially caused destruction in the cochlea, the normal cavity and contents of which have been almost totally substituted by a permanent inflammatory product—sclerotic osseous tissue. In the other parts of the labyrinth the destruction has confined itself to the membranous structures, which in other post-mortem examinations of deaf-mutes have also been found missing, though in all these cases the origin of the deafness has not been stated for certain.

In a previous paper I have had an opportunity of laying stress on the fact that post-foetal inflammatory processes may be—even entirely—localized to the labyrinth, and leave behind osseous tissue of more or less sclerotic character,⁴ while most other authors have considered such morbid changes of the labyrinth, when found by post-mortem examination, to be due to congenital malformation, because the

¹ Bochdalek: "Einige pathologisch-anatomische Untersuchungen der Gehör- und Sprachwerkzeuge von Taubstummen, als Beitrag zur Pathologie des Gehörsinnes." *Med. Jahrb. d. k. k. österr. Staates*, Bd. xl., oder neueste Folge, Bd. xxxi., S. 129–136, 269–277.

² H. Schwartz: "Beiträge zur Pathologie und pathologischen Anatomie des Ohres." *Arch. f. Ohrenheilk.*, Bd. v., p. 292, etc.

³ Politzer: "Lehrbuch der Ohrenheilkunde," 1882, Bd. ii., p. 809.

⁴ Mygind, *l. c.*, p. 113.

labyrinth, or a portion of it, seems to be missing, the abnormality thus appearing to be due to arrest of development. The correctness of this opinion of mine has since been confirmed by a post-mortem examination of a deaf-mute with acquired deafness, made and described by P. C. Larsen and myself¹; in this case the entire labyrinth was substituted by osseous tissue, which without any doubt was the residuum of a post-foetal inflammatory process.

The present case forms an interesting supplement to that of Moos concerning a boy aged three, in whom an affection of the labyrinth developed during measles.² In this case (published quite recently), which was examined very minutely when the morbid changes were still fresh, there was found a perforation of the membrana fenestræ rotundæ, the adjacent parts of which showed intense congestion, while the stapedio-vestibular articulation was normal. As far as the labyrinth was concerned, the inflammatory process was most highly developed in the cochlea, and especially in the scala tympani. Although the morbid changes were of quite recent date (at the utmost two weeks old), ossification of the inflammatory products had already begun in the cochlea. There can hardly be any doubt that the pathological changes originally present in my case have been almost identical to those described so thoroughly by Moos in his case—the only case of post-mortem examination of labyrinth-disease caused by measles existing in literature where a microscopical examination has been performed. As far as the nature of the morbid changes in such cases is concerned, Moos states that the inflammatory process was accompanied by invasion of bacteria, the lining membrane of the tympanum being inflamed, while in the membranous labyrinth was found coagulation of the lymph and aggregation of lymphoid cells, together with formation of thrombi in the vessels caused by fatty degeneration of their endothelium; there was furthermore necrotic degeneration of

¹ P. C. Larsen and Holger Mygind: "Ein Fall von erworbener Taubstummheit, mit Section." *Arch. f. Ohrenheilk.*, Bd. xxx., p. 188.

² S. Moos: "Untersuchungen über Pilzinvasion des Labyrinthes im Getolge von Masern." *Zeitschrift f. Ohrenheilk.*, Bd. xviii., pp. 97-154. *These ARCH.*, vol. xviii., p. 49.

tissue, and in some places—as mentioned above—ossification of the inflammatory products.

It will be remembered that in the present case no sign of atrophy of the auditory nerve was found, although it had been out of function on either side for a considerable period of time. This is another proof of a statement made by me before, viz., that the auditory nerve has not a strong tendency to become atrophic from inactivity, atrophy of this nerve being altogether found only in a minority of post-mortem examinations of deaf-mutes.¹

It must remain undecided whether the slight flattening, etc., of the convolutions of the posterior and inferior parts of the left frontal lobe of the brain is to be explained as a result of inactivity of the speaking centre. In the case of acquired deaf-mutism examined recently by P. C. Larsen and myself, the flattening of the third convolution of the left frontal lobe was very much more pronounced. It is, however, to be supposed that atrophy of this portion of the cortex of the brain is not so uncommon in deaf-mutes as the existing reports of post-mortem examinations might induce us to think.

¹ Mygind : "Die angeborene Taubheit," p. 58.

**THREE CASES OF DUMBNESS (APHASIA) WITHOUT
DEAFNESS, PARALYSIS OR MENTAL DEBILITY
(TWO CONGENITAL AND ONE CAUSED BY FRIGHT
AT THE AGE OF TWO YEARS AND A QUARTER);
ALSO**

**A CASE OF DEAF-MUTISM THE RESULT OF FRIGHT;
A CASE OF CONGENITAL DEAF-MUTISM THAT DIS-
APPEARED; AND**

**A CASE OF DUMBNESS FROM PARALYSIS OF THE
TONGUE.**

BY V. UCHERMANN, OF CHRISTIANIA, NORWAY.

Translated by Dr. J. M. MILLS, New York.

IN the course of my investigations of deaf-mutism, I came across two cases of congenital aphasia and a case of speechlessness caused by fright, which I considered worthy of publication on account of their rarity as well as the theoretical interest attached to such conditions. I will first refer to the different forms of the disease and add a few critical remarks. This will afford an opportunity to mention a case of deaf-mutism produced by fright, a case of congenital deaf-mutism that disappeared, and also a case of aphasia from paralysis of the tongue.

CASE I. B. M. G., born in Birid, on December 21, 1872. The parents were in good health, of temperate habits, and not related. Among the relatives of the mother was a case of deaf-mutism, otherwise no instance of deafness or mental debility. The patient is the next to the youngest of seven children, the other children being in good health. There is nothing to be stated concerning the period of pregnancy, or the hygienic condi-

tions. The boy has good eyesight and hearing, understands everything that is said to him, and does everything that is ordered of him in a methodical manner, but up to the age of nine and a half years, when he entered the Deaf and Dumb Institute at Hamar, he could only say "yes" and "no," and only began to say that when he was six and a half years old. When he was quite young he had whooping-cough. Concerning his stay at the institute, the superintendent, Mr. Hofgaard, writes: "In the class in articulation, he was, in the beginning, a troublesome pupil, especially was it difficult to pronounce the 's.' In the year 1886 he was sent home in order to attend the normal school. His speech was always difficult and at the same time of a spasmodic character. He always spoke as little as possible, and if he wished to say anything he required time in which to collect his thoughts and compose himself. At the same time he had trouble with his under jaw and tongue."

When I saw him, in the year 1885, his faculty of speech, in repeating what was spoken by others, was very good. Intentional voluntary conversation, however, was difficult; stuttering or spasmodic movements of the lower jaw were not apparent. He had an intelligent expression and, as the superintendent states, learned easily. The examination of the ear gave the following result: Both *Mtt* looked dull in their anterior and posterior portions, a trace of the reflex was present. He heard (with face turned away) whispered words and sentences at a distance of 7-8 metres. Watch in 24-36." He stated that he had always heard well: "He heard and understood everything that his parents, sisters, and brothers said to him, but he could not speak." Pharynx and larynx were normal.

This is the case which I described briefly in 1885, in my report to the "kirke department" (*s. Tidsskr. for prakt. med.*, 1886).

CASE 2. E. K. A., Dybirk, born in Oerlandet, on November 9, 1869. The parents are not related and are quite healthy. No instance of deaf-mutism, deafness, mental debility, or epilepsy in the family. He is the youngest of eight children, the next youngest is four and a half years older. The other children are well. He entered the public Deaf and Dumb Institute at Drontheim on October 17, 1888. At that time he could only say "yes" and "no," and notwithstanding his good hearing and understand-

ing, could never say any more. The examination of the patient in February of the same year showed the following condition : Right *Mt* perhaps somewhat indrawn ; the left *Mt* was dull, whitish, with a white spot anteriorly, a trace of the reflex. Both drums are movable (Delstanche). Heard a whisper, with both ears, in at least 24.' Has normal hearing for all instruments, tuning-forks (from 64-4096 vibrations, Appun), Galton's whistle, Politzer's acoumeter, table bell, watch, etc. Nose, pharynx, and larynx are normal ; vocal cord, normal in appearance and possessing normal movement. The tip of the tongue deviates a little to the left when thrust forward. He cannot stretch it out to either side (of the corner of the mouth) nor bend it down between the under lip and the incisor teeth of the lower jaw. When he opens and closes the mouth many times in succession (moves the lower jaw up and down), there is often, at the same time, a side movement of the jaw before he attains his object. When ordered to close his teeth firmly together, the mouth is drawn somewhat upwards and towards the left.

The teeth are irregular (rachitic). He cannot whistle, but places his mouth in the proper position. He appears intelligent, understands everything that is said to him, and can repeat all the letters of the alphabet ("r" and "s" with difficulty) and syllables, also many words. He is easily embarrassed and lacks self-confidence ; often there is a spasmodic movement of the lower jaw toward the sides when he attempts to pronounce words which he cannot bring forth.

CASE 3. M. O., Myren, born on January 1, 1854, in Fredoe (near Kristiansund), the next eldest of six children. The parents and the rest of the family are healthy in every respect ; not related. According to the mother's statement she was an unusually lively and well-developed child, spoke distinctly, and was perfectly well. Her greatest pleasure were some sheep with which she always amused herself. For some reason or other this annoyed the young shepherd, who determined to frighten her. He carried out his intention by placing his jacket over his head and waving his arms. When the parents came to the child they found her screaming persistently, and this screaming continued for fourteen days. She also, in consequence, suffered with epilepsy, which lasted four years. This girl, who had previously spoken easily and fluently, now, when she attempted to speak, began to stutter and could not utter the words, "and, therefore, she gave up the

attempt to speak." At the age of thirteen she came to the public deaf-mute institute at Drontheim, where she remained five years and learned to read and write. In the records of the institute the hearing is not mentioned, but, according to information received, it was noticed that she heard. At that time they were instructed principally according to the writing method (writing and hand alphabet). When she returned home she was still unable to speak, so her mother began to learn the hand alphabet in order to be able to converse readily with her. As, however, she was always with her sisters and brothers she began gradually to pronounce a few words, and in the course of a year her vocabulary had increased so that she could, to a certain extent, make herself intelligible to her mother and acquaintances. When with strangers she was embarrassed and preferred to conceal herself.

When I examined her in March of the same year her condition was as follows: She heard the tuning-fork with both ears, tuning forks of 64-4096 vibrations Appun, and Galton's whistle, Politzer's acoumeter at least 12', a whisper in 14', watch in 6-8". The right *Mt* was somewhat dull in the lower and posterior portion, otherwise normal. Both drums somewhat movable (Delstanche), left rigid. Rinné +. I heard F (fork) of 256 vibr. (App.) 40 seconds longer on the mastoid process and 10 seconds longer by air-conduction than she. The tongue is movable in all directions, but it trembles very much when in motion, and can only with difficulty be held quiet in the same position. Nose normal. The patient has lateral granular pharyngitis; soft palate has normal movement. The larynx is normal in appearance, but she cannot say "a" when the tongue is held outstretched. Pronounces all the letters, but d, t, and r with difficulty. For a, e, and o she says ha, hä, and ho, but i and o distinctly. She cannot combine words into sentences, though she can put two words together, as, for example, "fint veir." Whereas she reads readily and fluently what she has copied in school from a "kristendomslaers" (catechism), though occasionally she loses her breath and "sputters out" some syllables. She cannot regulate her breathing. She has an intelligent appearance and possesses ordinary faculties.

Instances of congenital aphasia are very rare, at least very few are recorded.

Broadbent (*Medico-Chirurgical Transactions*, 1872) cites a case of partial dumbness in a boy eleven years old. He was the fifth of nine children of whom five were living at that time. The two youngest were stillbirths, and one child died with convulsions. The father died of phthisis. The patient was a delicate child, but never suffered with convulsions or any dangerous illness. When six years old he was run over and the left side of his head and the left arm and leg were injured. But he had not spoken before this occurrence. He could only say "no," "e" for yes, "dunno" for don't know, instead of father "fave," instead of mother "move," and an indistinct "keeger-kruger" in reply to all questions. Exceptionally he would utter other words, as, for example, "all right," "thank you." He could write his name, but could not write "yes," or "no," or other simple words. He could copy a card printed in written letters, but did not understand the meaning of a word, as, for example, "pen," only that of some figures.

From Broadbent's account we cannot ascertain if the boy received regular instruction; most likely he did not. It is only stated that his mother exerted herself diligently to teach him to speak. Broadbent assumes that the difficulty in speaking was not alone in articulation, nor was he an idiot. He understood what was said to him and could do errands correctly. He watched to see if he received the correct change if told beforehand how much it would be. As previously stated, he copied print in written letters, but, as it seems, could not connect the written sign with the sound of the word, with the exception of a few figures. Broadbent infers that the defect was due to a "lack of power to formulate his will into words," a central aphasia. Hartmann considers it likely that this is only an instance of mental debility ("Die Staubstummheit," S. 26), therefore an aphasia that is analogous to that found in idiots. "They do not speak, because they have nothing to say" (Griesinger). But it is apparent that Broadbent was aware of this, so that his conception of the case seems more probable.

In the year 1873 Waldenburg reported, in the *Berliner klinische Wochenschrift*, No. 1, S. 8, a case of congenital aphasia, which is cited by Hartmann (*l. c.*, S. 26) as the only

positive authentic case of complete congenital aphasia. The mother, in the third month of pregnancy, became paralyzed on the right side, and was aphasic. Since his birth the right half of the boy's body was more poorly developed than the left, and notwithstanding his good intelligence and hearing he did not learn to speak. It appears from Waldenburg's account that, in the first place, the aphasia was not complete; the child pronounced a few words "with evident difficulty," as "okka," for uncle. There was paresis of the right side of the posterior portion of the palate, and also afterwards, as it seems, paresis of the tongue (which could not be stretched out beyond the lips, no deviation of the tip of the tongue) and possibly also the lips. No mention is made of the mobility of the tongue toward the sides. According to the statement of the father there were also indications that deglutition was difficult.

There are, therefore, besides the symptoms of an affection of the left cerebral hemisphere (paresis of the right half of the body), also symptoms of an affection of the medulla oblongata, most likely of a secondary character (secondary sclerosis), as the child had formerly spoken a few words with the greatest ease before it was seen by Waldenburg, but still possibly it may have been congenital, and in that case an essential cause of the dumbness. The appearance of the child is said to have been very intelligent and the hearing was normal. He was six years old.

It is by no means my intention to deny that there is, at the same time, in this case an affection of the centre of speech, but the case is, as stated, not clear. It would be of great interest to ascertain something of the later development and future of the patient. The boy was from Schlesien, and his name was Richard Reh. The other two cases quoted by Kussmaul, that of Clarus, concerning a boy of three years, and that of Benedikt, a boy four years old, I consider, as Hartmann does, entirely unproved.

Imperfect or defective speech in children of that age is quite common, and is most frequently due to tardy development, caused either by feeble faculties or impaired hearing, or because the parents did not devote sufficient attention to

them ; while, on the contrary, the two cases cited by me must be considered as congenital ataxic (motor) aphasia.

The first patient in particular had a very animated, energetic appearance and also a good disposition, according to the testimony of all those who had intercourse with him (the pastor, teacher). This was also evident later when he went to school. Upon inquiry I obtained the following information from the superintendent, Mr. Hofgaard, of the Deaf and Dumb Institute at Hamar :

“ When he came here he could neither read nor write, nevertheless he did that which we requested of him, just as well as other children of his age, who heard well. He wrote with more ease than any of the others in the class, and, in fact, as well from dictation—in that he had normal hearing—as when writing independently, for being able to hear he possessed more power of speech than his deaf school-mates. His reading, as well as speaking, was all the time somewhat difficult.

In contrast with Broadbent's case the cause here cannot lie in the same location, but more peripheral, either in the line of communication between the central station (the intelligence), and the motor centre of speech right in this or between this and the corpus striatum. I believe, notwithstanding the appearance of the drum, that I cannot retain the theory formerly advanced by me, according to which defective hearing, in the first years of childhood (when, as is well known, speaking is most easily learned), was supposed to produce a certain inertness in the nerve-tract, particularly between the centre of hearing and the central station (entrance line), secondarily between this and the periphery (line of exit).¹ This theory is untenable, partly because the boy, so far back as he can remember, always heard well, and partly because he quickly comprehended what was said to him. The inertness was first apparent in the centrifugal current. It is difficult to say what changes have taken place in the tissues. That they cannot be very extensive or of a progressive character

¹ All symptoms of paresis, as may be recalled, and is often the case, were wanting here.

is shown by the partial recovery of the boy by means of the instruction ; so that now only a certain slowness in intentional speech remains. That it is not of a purely physical, molecular nature, which opinion might possibly be held of hysterical aphasia, is evident from the fact that this inertness is still present. It appears to me that the next most plausible deduction is that there was an extravasation of blood into the nerve-tract, either internal or external (peripheric) to the motor centre of speech or right into it, resulting in a cicatrix which could only be eliminated and made harmless by the movement of the surrounding neighboring cells.

The dysarthric phenomena, in this patient, were only of a secondary and subordinate importance, not at all prominent, and as is often the case in aphasic conditions.

The second case is more complicated, inasmuch as in this instance there exists a limited movement of the tongue, which cannot be carried to either corner of the mouth, or bent between the lower lip and the incisor teeth of the lower jaw. The question is whether we are justified in considering this an affection of the medulla oblongata or pons, or whether the cause must be sought farther upward. In my opinion the latter is more probable.

The third case is notable from the fact that the acuteness of hearing is less than in the other cases (though she hears a whisper in 12-14'), which together with the causes advanced (fright, epileptiform convulsions) indicates a larger extension of the original central affection, probably including the centre of hearing itself and a greater or smaller part of the cortical substance. It could not be ascertained how much weaker the hearing formerly was than now. That fright can be the cause even of complete deaf-mutism is shown by a carefully observed case (the fourth) that will be more minutely described later on. The child, in every respect vigorous and healthy when three years old, was left in sport alone upon the roof of a playhouse. It became very much frightened and cried unceasingly ; upon this followed an illness of two months. This illness manifested itself principally in a high degree of irritability without fever or convulsions, and with complete deafness for speech

and consequent deaf-mutism. The child is now a grown up intelligent young man with complete deafness of the right ear. He has hearing for sound in the left ear, but no hearing for voice or speech. He hears the sound but does not comprehend what it is.

In contrast to this a case (5) has been reported to me of congenital deaf-mutism that disappeared, which possibly could be pronounced of a central nature. The case is as follows:

Johan Johansen Tórndseie, born November 26, 1881, in Vaug. Illegitimate child. There is no instance of deaf-mutism among the relations, nor of deafness, disorder of the mind, idiocy, feeble-mindedness, or retinitis pigmentosa. At the age of three, the child being then in miserable and emaciated condition, was brought to its present foster-parents. It was troubled very much with worms. On one single occasion it was delivered of sixty-seven lumbricoids. It improved gradually in bodily strength, but signs of hearing were observed only in the last two years (1888-89) particularly in the last year. Has ordinary faculties. 1889: hears now loud speaking in 6-7 metres, repeats with faultless voice several words (nei, ja, ske, moster, etc.).

I had no opportunity to examine her ears; however, there is no report of a discharge. The relatively considerable acuteness of hearing, which was developed in the course of two years, seems to argue against a peripheric cause of the deafness, which in the course of a few years disappeared of itself; while on the contrary helminthiasis is a well-known cause of aphasia in children (S. Kussmaul: *Die Störung der Sprache*; Arndt-Eulenburg's *Encyklopädie*, 2. Ausg.), and this was present, in this case in a most aggravated form. The explanation in this case is that the influence was of a reflex nature, introducing a "paralysis" (probably a vasomotor and atrophic lesion) of a certain section of the surface of the brain. That this action extended, at the same time, to the labyrinth must be conceded in those cases where all hearing for sound ceases temporarily or is absent, as the history of the disease in this case indicates. As long as we do not possess a more exact examination of the ear nothing more definite can be said.

It appears, therefore, that many things point to the correctness of the above-mentioned explanation of the third case. It is difficult to give an opinion as to the nature of this central affection. It might be considered a purely molecular change, or rather, on account of the persisting functional debility, a disturbance in the circulation, and consequent disturbance of nutrition in the region mentioned. Arndt (*l. c.*) calls this condition simply a paralysis, without thereby being any more explicit. Pathological-anatomical examinations alone can bring us nearer to the truth.

In conclusion I would mention a fourth (6) case of infantile dumbness of which I only recently obtained information. Also this patient had good hearing and perceptive power; did not, however, belong to the aphasic group, in that in this instance the cause is a tongue and pharynx paralysis, most likely of bulbar or mesencephalic origin. This patient also received instruction in a deaf and dumb institute, naturally without success. The case is as follows:

A. M. Andreasdatter, born in 1857, in Grimstad. The father was a porter on the quay; was not addicted to drink. The parents enjoyed good health; were not related. No instance of mental debility among the relatives. Mother died on child-bed. Good hygienic surroundings. Patient is the third of several children; the others were healthy. In former years she suffered with a severe form of epilepsy, but is now well. Passed through the Deaf and Dumb Institute at Christiansand. Is unmarried. The superintendent added to the history: "Feeble, body deformed. Is not a deaf-mute. Squints very much and is very lame." In addition I received from Dr. Ellefsen in Grimstad the following information: She has paresis of the tongue. It cannot be stretched forward nor can it be moved toward the side. She can say "ja" and "nei," "farmer," and a few other words, but everything indistinctly. The larynx shows nothing abnormal. She has some difficulty in swallowing solid food, but not in chewing. Smell and hearing are very acute. Understands everything that is said to her, but can neither read nor write. Co-ordinate movements with the arms and hands are almost impossible. Can walk, however, tolerably well, even a long distance. Looks very small and thin; the expression of the face is old-fashioned. The

form of the cranium indicates microcephalus. Lacunar somewhat sunken in the uppermost parts. The father asserts that nothing abnormal was to be seen at her birth, but that three weeks after birth the child began to be sickly, and that the above-mentioned symptoms developed gradually later on. She did not learn to walk until she was over three years old. She is myopic and has convergent strabismus ; there is a paresis of both upper extremities. Upon inquiry I obtained later the following additional information : The squint mentioned is undoubtedly of a paralytic nature, that is, a paralysis of both muscul. extern. (N. abducentes). Atrophy of the muscles of the tongue cannot be discerned. The muscles of the upper as well as the lower extremities are somewhat poorly developed. The muscles of the hand, especially the thenar, are atrophic, as also the right lower extremity, which is 4 *cm* shorter than the left. The sensitiveness is not appreciably decreased in any part. There is no contraction or rigidity in the muscles of the extremities.

It appears that this is a case of an atrophic, perhaps a sclerotic, process that has run its course and that is located in the medulla oblongata and possibly also in the pons (and the cerebellum?). There are also symptoms of an affection of the cortex of both cerebral hemispheres, particularly on the left side (polio-encephalitis, Strümpel). The case is, as such, interesting and also merits attention for the reason that it was sent by mistake to an institute where it did not belong. The physicians who have explanations to offer concerning abnormal children should bear in mind that this case, though rare, may yet occur.

A CASE OF PARTIAL DEVELOPMENT OF BOTH AUDITORY ORGANS.

BY TH. HEIMAN, OF WARSAW.

Translated by CASEY A. WOOD, M.D., of Chicago.

(With Three Wood-cuts.)

MALFORMATIONS of the auditory apparatus are not, in my experience, of every-day occurrence. They may affect the external, the middle, or the internal ear, and in all cases present themselves either as a partial or as an adventitious development of a whole section or of single parts of the organ.

Schwartz and Montain describe a case of complete absence of auditory nerve and labyrinth. Michel mentions one instance of unilateral and Moos and Steinbrügge another of bilateral defect of the labyrinth. Hyrtl and Voltolini observed a cochlea in the early stage of its development—in its vesicular form. The former also noticed a case of absence of the aquæductus vestibuli. Buhl and Hubrich believe that absence of the cochlea is very frequently associated with incomplete development of the semicircular canals. Toynbee, Claudius, and others describe defects in various parts of the labyrinth. As examples of adventitious development may be mentioned two ampullæ for one horizontal semicircular canal (Gerlach), a double aquæductus vestibuli (Hyrtl), etc.

The tympanic cavity may be entirely wanting or be replaced by bone.

Partial defects are: defective development of the emi-

nentia pyramidalis, absence of the promontory, of the canal for the tensor tympani, of the round and oval windows, of one or more ossicles, etc. In the same way absence of the Eustachian tube (Gruber), of its cartilaginous portion (Moos and Steinbrügge), and of one of the ostia (Wreden), has been recorded. Cassebohm and Barbou found a double tympanic cavity in a bicephalous monster.

Various malformations affect the external ear. These are commonly accompanied by abnormalities of the middle ear and almost always by arrested development of the auricle. In such cases a normal auricle is rare. The usual locality of the external meatus has been indicated in more than one instance by merely a bony depression directed towards the tympanic cavity. The following are the partial defects: absence of the cartilaginous portion of the auditory canal and of the annulus tympanicus; arrested ossification after birth, so that later on in life both the annulus tympanicus and the membranous canal retain their primitive condition. A double external meatus has been recorded (Bernhard). Worthy of notice is the so-called fistula auris congenita, which, as we know, takes the form of a canal running parallel to the external meatus, 1 *cm* above the tragus and 1 or 2 *mm* in front of the helix. According to Urbantschitsch this fistula has no connection with the development of the ear.

Entire absence of the auricles is rare; it more frequently happens that component parts of them fail to develop. Double auricles, adventitious growths of various portions, as well as cartilaginous and bony protuberances, are also not uncommon.

Apart from these, which are perhaps the chief malformations one meets with, there are congenital defects, of various degrees, that affect the form, size, attachment, and arrangement of the different parts of the auditory organ.

The malformation which I am about to describe occurred in a child which I examined two days after birth. It consists of a *complete absence of both external meatuses with an incomplete development of the auricles*. (See accompanying figs. 1, 2 and 3.) A considerable portion of the palate is also wanting posteriorly; the articulation of the temporal bone with the zygoma is incomplete

and the middle ear is evidently undeveloped. The skin and cartilage of the external ear are well developed on both sides. The lobules and in part the helices are normal, the former being immediately, and without any indication of a depression, continuous at their inner margin with the skin of the face. The upper border of the left helix is adherent to the facial skin, as indicated by a superficial groove that terminates in front at the anterior-superior angle of the auricular attachment by a minute fossa. The antihelix and crura bifurcata are replaced by a cartilaginous, ring-like tuberosity whose convexity is directed inwards—in a direction opposite to the normal. There is a distinct depression (concha ?) in this circular piece of cartilage. Beneath it is a marked hollow in the skin corresponding to the external opening of the meatus auditorius externus.

The site of the external opening on the right side is occupied by a small furrow. In front and above it are two cartilaginous tubercles covered with normal skin (antihelix ?) ; their direction is from within outwards and somewhat upwards until their termination in the helix. Where under normal conditions one of the crura bifurcata is found, along with the fossa triangularis and navicularis, there is a round depression in the skin which in its lower segment shows a semilunar groove and in its upper a small fossa. Other parts of the auricle could not be traced in the external skin. The cartilage of the tragus could be plainly felt. On the posterior surface of both auricles there are several transverse superficial furrows ; on the lobules, round depressions.

The middle section of the soft palate, as well as the centre of the hard palate behind, is wanting, a defect measuring transversely about $1\frac{1}{2}$ cm and antero-posteriorly $2\frac{1}{2}$ cm. The nasal structure is normal. The incomplete articulation of the zygomatic process of the temporal bone with the processus temporalis of the zygoma is marked by a depression of the skin—best seen on the right side.

The cause of this malformation, as in all similar cases, is unknown. The infant's mother, a poor woman, made her living by carrying heavy baskets, which rested and more or less pressed upon her abdomen ; possibly this may have had some effect upon the development of the child ; and yet her other children, nine in all, were brought into the world under the same influences, and each was well formed.



FIG. 1.

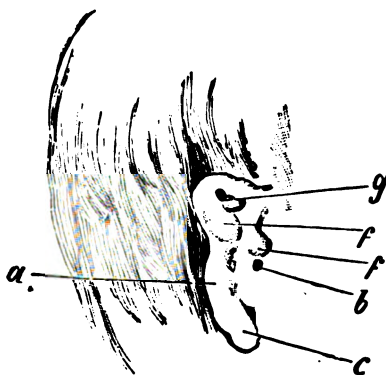


FIG. 2.

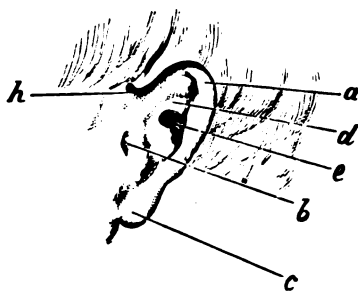


FIG. 3.

a = Helix.
b = Introitus m. aud. ext.
c = Lobulus.
d = Cartilago circularis.
e = Fossa intercartilaginea.

ff = Tubercula cartilaginea.
g = Fossa supra tubercula.
h = Fossicula in angulo superioris
helicis.
kk = Sutura squamoso-xygomatica.

Before discussing the question as to what period (month) of intra-uterine life these malformations showed themselves, we must refer to certain details connected with the development of the external and middle ear.¹ These, as is well known are developed from the primary branchial cleft. After the coalescence of the anterior or ventral part of this fissure, its dorsal portion is converted into a tubule, of which, at an early stage, it is possible to distinguish a very short external segment covered with the ectoderm, and an internal and longer section clothed with the entoderm. Between these, later on, is developed, from the primary branchial arches, a secondary formation which is mainly derived from the mesoderm. Externally it is covered by the ectoderm, and internally with the entoderm. On its inner aspect it consists of soft gelatinous connective tissue, which contains the ossicles that are formed from the primitive branchial arch. The posterior part of Meckel's process serves for the development of the hammer and the incus, while from the posterior aspect of the branchial arch is derived the stapes and its muscle.² The areolar tissue surrounding the ossicles disappears from the inner portion (covered with endoblastic cells), which corresponds to the primitive internal embryonic groove, and leaves an air-space in which are the small bones. In this way the tympanic cavity is formed. The small bones do not lie free within the tympanum, but are covered by the mucosa, which originates from the mesoderm. The embryonic connective tissue usually disappears from twelve to twenty-four hours after birth, but it may do so before it—that is, before respiratory movements commence (Zaufal, Urbantschitsch). Incomplete absorption of this foetal tissue may be detrimental to the hearing of the child. The primitive cavity of the tympanum communicates with the pharynx by means of an opening whose prolongation later on becomes the Eustachian tube. The external portion of the secondary

¹ I shall not refer to the formation of the internal ear, as that is developed independently of the other portions of the auditory organ; moreover, in the case under discussion we have no direct evidence that the labyrinth was or was not developed.

² According to Kölliker and Balfour, the stapes is developed from the cartilaginous wall of the labyrinth.

areolar tissue formation above mentioned is not so delicate as that which presents towards the tympanic cavity, and from it the membrana tympani originates. The outer ectodermal depression becomes the meatus auditorius externus.

The auricle at first arises from the posterior aspect of the external opening in the form of a small protuberance (Schenk); it is visible in the sixth week of foetal life, and in the eighth the helices are discernible.

The palate, which divides the naso-pharynx into an upper nasal and a lower pharyngeal space, is formed from horizontal bony plates (processus palatini) that have their origin in processes of the superior maxilla. The palatine margins approach one another in a direction from before backwards, until at the end of the third month of intra-uterine life the entire fissure is completely closed with the exception of a small opening anteriorly—the naso-palatine canal. Failure to accomplish this closure results in various degrees of the malformation known as “cleft palate.”

In our case the condition of the auricles, the absence of the external meatus, and the defect in the palate, lead us to conclude that development of the parts must have been interfered with between the end of the second and the beginning of the third month of foetal life, and this formative failure affected all the parts between the naso-pharynx and the auricle, and included the middle ear.

Whether the labyrinth was also included in these malformations it is impossible to say. Children of so tender an age do not respond to sounds of any kind (v. Troeltsch); how much greater must the difficulty of hearing be when changes like those above described are present! If later on in life one could demonstrate, by a tuning-fork examination of bone-conduction, that sounds were perceived, there would be definite grounds for asserting that little or no malformation of the internal ear had occurred.

It would be waste of time to consider the possible treatment of such a case as this, and I do not care to indulge, as has been done, in a purely theoretical discussion of the question. It only remains to add that the child lived three weeks, and finally died of starvation, having been unable to take the breast or any other form of nourishment.

FOREIGN BODY IN AUDITORY CANAL FOR TWENTY YEARS.

By HERMAN W. HECHELMAN, M.D.

PROFESSOR OF OPHTHALMOLOGY AND OTOTOLOGY, WEST PENNSYLVANIA MEDICAL COLLEGE,
PITTSBURG, PA.

On June 25, 1891, Mrs. W—— aged thirty years, consulted me on account of noises in her right ear with some loss of hearing. Upon examination the auditory canal was found to be filled with impacted cerumen. The cerumen was removed by means of warm water and a syringe. With the cerumen I noticed two hemispherical bodies of dark-brown color and solid consistence, which upon examination proved to be a pea split into halves. Upon questioning the patient I elicited the following history :

When ten years of age, P., in play, put a pea into her right auditory canal ; she was taken to a physician by her father, but whether he claimed to have removed it or not she does not remember. After this she experienced no difficulty whatever until eight years ago, when she accidentally thrust a knitting-needle into her right auditory canal in the attempt to stick the needle into her hair. This accident caused considerable pain and some little bleeding. She again consulted a physician, who, without an examination, claimed that she had perforated the membrana tympani ; he advised her to simply wash out the ear and apply moist heat. Immediately following the accident, P. claims she could hear nothing ; her hearing became better in a few days, and in two weeks, she states, it " was all right again." Since then she has had no trouble with her ear until about ten days ago, when she noticed noises and some loss of hearing.

There is no doubt in my mind but that the pea remained in the auditory canal since its first entrance twenty years

ago, or when P. was ten years of age. She had never consulted an aurist until she came to me.

Before the removal of the cerumen and pea P. could hear the tick of my watch at two inches, immediately after the removal at six inches, and on the following day at fifteen inches. After the removal of the cerumen and pea the canal presented a perfectly normal appearance, the membrana tympani was slightly injected, but no more than one would expect after syringing an ear. There were a few granulations, which bled slightly on the super-posterior quadrant of the membrana tympani, the seat, no doubt, of the injury inflicted by the knitting-needle.

A NEW UNIVERSAL DOUBLE-ACTING SNARE.

By CHARLES A. BUCKLIN, A.M., M.D.

(With a Wood-cut.)

THE good principles of all similar instruments have been combined in this snare and their inherent defects have been obviated.

The wire is attached to a solid stylet, the objections to which are overcome by the powerful ratchet motion which draws it. A screw motion is also attached to the same stylet, thus enabling the operator to use a very slow-cutting snare, where hemorrhage is feared, while the ratchet motion provides a rapid cutting one where there is no reason to expect hemorrhage. The handle and ratchet motion may be detached at pleasure, leaving an instrument suitable for the slow strangulation of a very vascular growth.

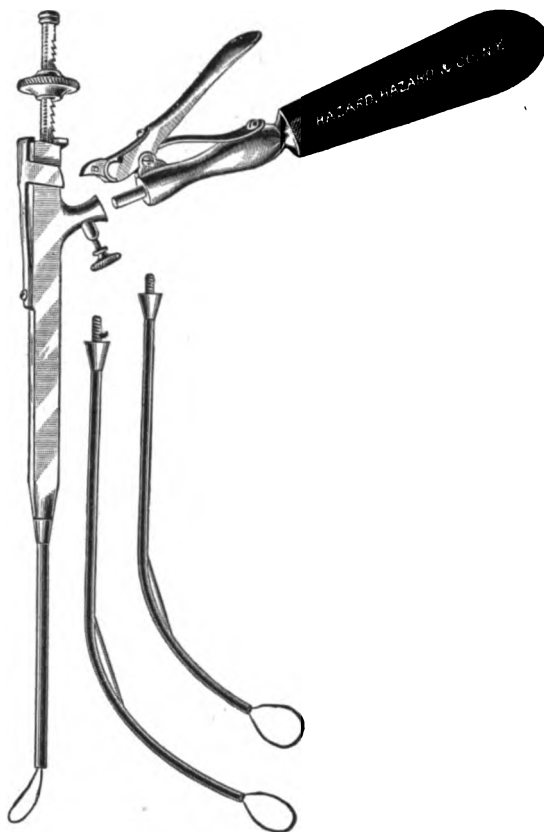
The instrument has a straight tip for the nose, and curved tips for reaching the larynx and naso-pharynx through the pharynx.

In curved canulas all attempts to use flexible stylets under severe traction are dangerous, as they must break sooner or later in making the transit of the curve.

With this wire *écraseur* every benign neoplasm or hypertrophy found in the nose, naso-pharynx, or pharynx can be removed at a single sitting in a manner which commands the approval of the most conservative operator. This instrument also fully meets all the requirements possessed by Stoerk's laryngeal guillotine or wire *écraseur*, and furnishes one not provided with laryngeal forceps with a simple and

effective means of extracting many foreign bodies which lodge in and about the larynx.

If the instrument is firmly secured at the detaching joint, the wire properly fastened, and the clearances of the ratchet under strain are one thirty-second of an inch, it will never fail to cut any growth the loop embraces.



The straight canula is armed with wire by passing it through the eyes of the slightly projecting stylet from opposite sides; the required loop having been formed, the stylet is drawn by the ratchet motion and the projecting ends of the wire are cut.

The curved tips are armed with wire by bending one six-

teenth of an inch of the end of the wire at an angle of forty-five degrees. It is then passed through the first eye of the stylet into the opening at the curve of the canula with the convexity of the wire impinging on the concavity of the canula, having returned through the curved canula with its convexity impinging on the concave surface of the canula. When the wire appears at the opening it is twisted until the bent point is opposite the second eye in the stylet, which it will enter easily, and the loop is complete.

By the pressure of the thumb on the top of the instrument the wire loop after having been drawn can be returned instantly to position for further operation through any of the tips.

For further particulars and the history of steel-wire snares see *New York Medical Record*, July 4, 1891, p. 269.

DIFFERENTIAL DIAGNOSTIC POINTS BETWEEN HUMAN OLFACTORY EPITHELIUM AND RESPIRATORY CILIATED EPITHELIUM.

BY HERMANN SUCHANNEK, ZURICH.

Translated and abridged by Dr. J. A. SPALDING, Portland, Me.

I HAVE already described in the *Archives of Microscopy*, vol. xxxvi., p. 375, *et seq.*, the normal structure of the olfactory mucous membrane, and I will here repeat so much of that description as may seem necessary to publish to those interested in the results of my long investigations into this topic.

“The normal human olfactory epithelium, which in the new-born alone extends continuously over the uppermost portion of the nasal cavities, and in older children and adults is only to be discovered irregularly scattered throughout that region, consists: (1) of a lining membrane of finest ciliated epithelium of easily differentiated, easily destroyed cilia (olfactory cilia), and therefore only to be seen in fresh specimens; (2) a protoplasmic border of unpigmented and pigmented cells containing the extreme terminations of the supporting and olfactory cells (bell cells); (3) a full development of supporting cells, and particularly of the zone of olfactory cells, together with a row of basal cells which without a dividing cuticle rest directly upon the tunica propria; and (4) a moderate amount of pigment which surrounds Bowman's glands and the olfactory fibres in heaps and stripes.”

(The rest of the paper, some five pages long, contains infinite microscopic detail which for want of space we are regretfully obliged to omit.—H. K.)

REPORT ON THE PROGRESS OF OTOTOLOGY DURING THE SECOND HALF OF THE YEAR 1890.

By A. BARTH AND A. HARTMANN.

Translated by DR. MAX TOEPLITZ, New York.

a.—NORMAL AND PATHOLOGICAL ANATOMY, HISTOLOGY, AND PHYSIOLOGY OF THE EAR AND NASOPHARYNX.

By A. BARTH.

I.—ANATOMY.

a.—HEARING ORGAN.

1. Prof. WAGENHÄUSER. Pathological anatomy of the hearing organ. Reprint from the "Text-book of Special Pathological Anatomy," by Ziegler, 6th edition, 1890.
2. MÜLLER, E. Contributions to the anatomy of the tympanic cavity. *Med. Correspondenzbl. des Würtemb. ärztl. Landesvereines*, 1890, vol. lx., p. 233.
2. SCHEIBE, A. Bacteriological investigations of otitis media in influenza. (From the Pathologico-Anatomical Institute at Munich.) *Centralbl. f. Bacteriologie u. Parasitenkunde*, vol. viii., p. 225, 1890.
4. MAGGIORA, A., and GRADENIGO, G. Bacteriological observations upon the contents of the Eustachian tube in chronic catarrhal inflammations of the middle ear. *Ibid.*, vol. viii., p. 582, 1890.
5. GLÄSER, E. Investigations on cholesteatomata and their teachings regarding the origin of these growths. (From the Pathological Institute at Breslau.) *Virchow's Archiv*, vol. cxxii., p. 389, 1890.

6. HABERMANN, I. Clinical communications. Hemorrhages in inner ear. (From Prof. Chiari's Pathologico-Anatomical Institute in the German University at Prague.) *Prager med. Wochenschr.*, 1890, No. 39.

7. SCHWABACH, Berlin. Disturbances of hearing in meningitis cerebro-spinalis and their anatomical basis. Reprint from the *Zeitschr. f. klin. Med.*, vol. xviii., Nos. 3 and 4.

1. The material is clearly and concisely arranged upon an anatomical base.

2. SCHEIBE examined bacteriologically the secretions of eight cases of suppuration of the middle ear due to influenza, viz.: In three cases immediately after paracentesis, in three others one or two days after the operation, and in the remaining ones five and thirty-five days after the beginning of the discharge. The direct examination of the secretions taken from the middle ear showed in all eight cases, besides different cocci, bacilli which did not grow upon ordinary nutrient soil. Their length varied between 0.2 and 0.8 μ . Their form was also different. The number was the greater the fresher the case and the more acute the symptoms. The author hopes that a subsequent epidemic of influenza will throw further light upon the importance of these bacilli.

4. On account of clinical observations, which make it quite probable that chronic middle-ear catarrh develops by propagation of infectious microbes from the tube, MAGGIORA and GRADENIGO examined, in thirteen cases of progressive deafness, the secretions of the mucous membrane of the tube by introducing probes under certain precautions to the depth of about 8 mm into the tube, and from these they made pure cultures. There was found but a small number of putrefying microbes, which frequently occur in the air, but no specific microbe constantly and none in so great a number that the result of the examination might be considered positive. The authors, however, consider an infection during the period of hypertrophic and catarrhal naso-pharyngeal inflammation as probable. A treatment modifying the condition of the mucous membrane would not be proper before the beginning of atrophic changes.

5. After a careful review of the literature GLÄSER draws the following conclusions from a description of cholesteatomatous growth of the meninges: "In consequence of an unknown irritation the endothelial cells begin to proliferate upon the sub-arachnoidal trabeculæ; the proliferated cells mutually flatten by

pressure and finally form the well-known small scales," etc. The author, at any rate, does not consider it certain that all cases of cholesteatoma may be explained in this manner, and he expects further explanations, especially from the observations of clinicians. The paper, however, is quite valuable as to the present aspect of the question, and its careful perusal is urgently recommended.

6. HABERMANN, in a marked case of *pernicious anæmia*, examined the right ear and found in the cochlea and also in the vestibule and semicircular canals several hemorrhages. The vessels did not exhibit lateral excavations near the hemorrhages. There existed during life hardness of hearing, subjective noises, and vertigo. The two former phenomena are, according to the author, positively due to the hemorrhages. Habermann observed a case which presented, in ordinary anæmia, hardness of hearing, subjective noises, and vertigo, associated with retinal hemorrhages. He explains these appearances also as being due to hemorrhages in the inner ear. No autopsy was made. In a specimen taken from a woman who had succumbed to tuberculosis, anæmia, etc., Habermann found a large defect in the membrana tympani, and the remaining portion of the membrane extensively calcified. At one spot in this calcification numerous bone corpuscles could be recognized under the microscope. Haversian canals and lamellæ were not found.

7. SCHWABACH examined the petrous bones of a woman who had succumbed to meningitis cerebro-spinalis, associated with considerable disturbances of hearing. The concise result of the microscopical examination is as follows: Extreme filling of the vessels running along the acoustic nerve and in all parts of the labyrinth, purulent infiltration of the arachnoidal sheath of the acoustic in all its branches, numerous ecchymoses between the partially well-preserved fibres in its median portion, extensive destruction of the same in the peripheric portion, principally before its entrance into the modiolus; formation of granulation tissue in the province of the ramus superior and medius—viz., in the ganglionic swelling, and also in its further course toward the vestibular structures. Caries of the bone at isolated places, especially in the region of the maculæ fibrosæ, the carious portions being filled with granulation tissue. Numerous hemorrhages arising from the newly formed vessels of the granulation tissue in the intumescentia ganglioformis Scarpæ, and also in the ganglion spirale, and consequently atrophy of the ganglionic cells. Nu-

merous ecchymoses in the lamina spiralis, infiltration with round cells, and atrophy of the nerve fibres. Purulent infiltration of the connective-tissue lining of the perilymphatic space in the cochlea (scala tympani) and also in the vestibular structures, with more or less extensive destruction of the same; formation of granulation tissue filling the vestibule entirely at some places. The changes were most marked in the right ear, which was affected in its function to a greater extent before death. In the middle ear there were still found the appearances of otitis media acuta, which had developed acutely three weeks before death and had hardly caused any objective symptoms ten days before death; in the right one fibrinous purulent exudation in the fenestral niches; in the oval window abundant granulation tissue with numerous thin-walled blood-vessels and a number of extravasations; partial destruction of the ligam. annul. bas. stapedis and filling of this portion with granulation tissue or fibrino-purulent exudation respectively. The infective agent was the diplococcus pneumoniæ (Fraenkel). According to course and anatomical condition the otitis media is considered to arise from direct immigration of the agens morbi into the tympanic cavity.

b.—NASO-PHARYNX.

1. LANDOW, M. A rare case of malformation of the nose, with some remarks upon the lateral nasal fissures. (From the surgical clinic at Göttingen.) *Deutsche Zeitschr. f. Chirurg.*, vol. xxx., p. 544.

2. FLATAU, TH. The connection of the nasal lymph channels with the sub-arachnoidal space. *Deutsche med. Wochenschr.*, 1890, No. 44.

3. SUCHANNEK (Zurich). Contributions to the finer normal anatomy of the human organs of smell. (With one plate.) *Arch. f. microsc. Anat.*, vol. xxxvi., p. 375, 1890.

4. BOUCHERON, M. Presentation of microscopical specimens (Présentation de pièces microscopiques). *Compt. rend. offic. de la Soc. franç., d'otol. et de laryng. Rev. de Laryng.*, etc., 1890, p. 577.

1. In a boy, aged five, only the right half of the nose was completely developed. In place of the left half there existed a proboscis-like formation, covered with epidermis, 1.5 cm long and 0.75 cm in diameter. It was situated between the inner canthus and the nasal root, and was perforated by a canal. Near the

inner canthus there was a coloboma of the lower lid. Four years later there existed in place of the projection a fistula, discharging moderately. The formation is explained embryologically, according to His, by disturbances in the process of folding and by the advance and descent of the nasal fields. Such disturbances are principally caused by amniotic bands and meningoceles.

2. After pointing out the importance of the connection between the lymph channels of the interior of the skull and the nose, FLATAU gives the results of his examinations, made with injections in twenty-one rabbits and cats. A direct connection could be found only in the nerve canals. The mass injected into the spinal column always passed close up to the nasal epithelium. The efferent lymphatics, and also the glands of the naso-pharynx, were well injected at places from the subarachnoid space.

3. The smelling epithelium in man does not cover in continuo in older children and in adults the parts heretofore described as the olfactory region, but only in irregular patches. The region of the olfactory epithelium is often marked at places by pigmentation of the mucous membrane. The smelling epithelium is covered with fine hairs, which are lower than the ciliated epithelium of the respiratory tract. SUCHANNEK could not find a boundary of protoplasm (membrana limitans olfactoria). At places—together with the olfactory epithelium—non-pigmented cells, free nuclei, and so-called bell-shaped cells are found. The nuclei of the supporting cells are more oval; those of the olfactory cells are round. The nuclear zone of the olfactory cells appears in three to four layers. There exists a boundary group of basal cells, which are not separated by a cuticula from the tunica propria. The peripheral ends of the supporting cells are frequently pigmented. In the tunica propria there exist Bowman's glands and olfactory fibres, and, between these, masses of pigment. The author could not prove a connection between the olfactory fibres and the sensory epithelial cells.

4. BOUCHERON demonstrated microscopic sections of an embryo, from which he concludes that in a number of cases the duct of the hypophysis should be considered as the origin of the bursa pharyngea.

II.—PHYSIOLOGY AND PHYSICS.

a.—HEARING ORGAN.

1. EWALD, Prof. J. R. Dependence of galvanic vertigo on the inner ear. *Centralbl. f. d. med. Wissensch.*, 1890, No. 42.

2. PIPPING, H. Contribution to the timbre of sung vowels. Examination with Hensen's logograph, at the Physiological Institute at Kiel. (With two plates.) *Zeitschr. f. Biol.*, vol. xxvii. (N. F., vol. ix.), p. 1, 1890.

3. SCHAFER, K. L. The perception and localization of beats and differential tones. *Zeitschr. f. Psych. u. Physiol. d. Sinnesorgane*, 1, p. 81, 1890. (Rev. in the *Beibl. z. d. Ann. f. Phys. u. Chem.*, vol. xiv., p. 739.)

4. APPUN, A. Acoustic experiments on the perception of low tones. *Ber. d. Wetterauischen Ges.*, 1889, p. 37. (Rev., *ibid.*, p. 392.)

5. PARRAGH, C. Demonstration of the interference of isochronous sound-waves by means of the telephone. *Zeitschr. f. physik. Unterr.*, 2, p. 247, 1889. (Rev., *ibid.*, p. 481.)

6. MACK, E. Experiment upon the vibratory form of stroked cords. *Zeitschr. f. d. physik. Unterr.*, 2, p. 264, 1888. (Rev., *ibid.*, p. 481, 1890.)

7. RALEIGH, Lord. On bells. *Phil. Mag.* (5), 29, p. 1, 1890. (Rev., *ibid.*, p. 890.)

8. FISCHEN-BENZON, R. von. The sounding echo. *Zeitschr. f. physik. Unterr.*, 1, p. 116, 1888. (Rev., *ibid.*, p. 478, 1890.)

9. BREUER, J. (Vienna). The function of otoliths. *Arch. f. d. ges. Physiol.*, vol. xlviii., p. 195-306. (With three plates.)

1. EWALD found, in mammals and in man, that in galvanization of the inner ear the head became inclined toward the anode. After the removal of both inner ears, the head remained in its normal position. After extirpation of one inner ear and application of the anode to the same side, the inclination of the head toward the corresponding side takes place with but six volts. If the anode is placed, under the same conditions, upon the intact side, the head does not move. Hence follows that (a) the galvanic vertigo depends upon irritation of the inner ear; (b) the active pole is the cathode; (c) the turning of the head does not take place toward the irritated side.

2. For the arrangement of the apparatus and the experiments, and also for the tables, we refer to the original. The results of these investigations are as follows: It is not proven that inharmonious partial tones occur with vowels in singing. The vowel sounds are distinguished from the sounds of most of the musical instruments, essentially by the fact that the intensity of their partial tones—Helmholtz used at this place the word "over-

tones"—depends not only upon their ordinal number, but principally upon their absolute pitch. Every vowel is distinguished by one or more intensifying regions of constant pitch; the intensity of the partial tone is the greater, the more exactly it meets the maximum point of such an intensifying region (this is in accordance with Helmholtz). With reference to the breadth of the intensifying regions, the author does not agree with Helmholtz. Sung vowel sounds contain only harmonious partial tones. The intensities of the single partial tones depend in no remarkable degree upon their respective ordinal numbers. The different vowels are distinguished among themselves by intensifying regions of different number, breadth, and position in the scale of tones. In different cases the wellnigh identical pronunciation of a vowel by different individuals speaking the same dialect could be determined.

3. The beat always appears to arise from the direction of the more intense of the two tones producing it. If they are approximately of equal intensity, it apparently develops in the region between the two sources of tone. The differential tone, however, is perceived on the side of the lower tuning-fork.

4. APPUN produced, by means of a metal lamella mounted with a metallic disc, tones free from overtones and found that in the descending tone series 10-9 vibrations, in ascending, however, only 11-12 vibrations are perceived as sound. With reference to tuning-forks he emphasizes the fact, that: 1. when the handle is placed in a wooden box provided with a rubber tube, instead of being firmly attached by clamps in the resonant case, it vibrates much longer. The resonator should be placed in front of the prongs. 2. The overtones may be eliminated by placing a firmly attached cloth ring, C^a 25 mm wide, over one of the prongs for one third of its length. The octave of the fundamental tone, which is said to form by longitudinal vibrations in the handle of the tuning-fork, cannot be eliminated.

5. By the insertion of a small inductor and a commutator between the poles of two telephones, the tone in the second telephone became more or less intense, according as the direction of the current is the same or opposite to that in the first telephone. In the telephones sound waves of the same or opposite phases are formed. Two combinational tones were simultaneously perceived.

6. A white cord is stretched above a black ground and just above it, at a right angle, a black one. If both be struck simultaneously, a parallelogram, appearing black upon gray, is formed in all the phases.

7. All bells are unsymmetrically formed, and, therefore, when struck, produce beats, which, according to the place struck and to the position of the ear relative to the bell, are perceived with varying distinctness. It is remarkable that bells do not sound much less musically than they really do.

8. When passing along a railing at every step a high, peculiarly whistling, rapidly disappearing sound is perceived, which is to be considered as the echo of the sound waves caused by the step and reflected from the rails. This sound is said to consist of but six to eight vibrations.

9. This full and elaborate paper is not adapted for a brief review. Every reader should form his own opinion of the importance of the subject from perusal of the original: 1. There are surely specific perceptions of the position of the head in reference to the vertical line and to progressive movement. It is proven for the former, that they originate in an organ situated in the skull. 2. It is highly probable from the topographical disposition of the otolithic apparatuses, that they, like the semicircular canals, are concerned in the perception of space. From their structure it is quite probable that the gravitation of the otoliths is the active irritation. 3. The phenomena of omission in frogs (and birds) with destroyed labyrinth and in deaf-mutes prove, that the labyrinth subserves the perception of position in space which is completely absent in the above-mentioned cases, if by immersion in water the perception of the gravitation of the body, which otherwise helps to determine its position, is for the greatest part eliminated. Every position of the head corresponds in man to a definite, characteristic combination of intensities of gravitation at the four maculæ. If we suppose that the gravitation of the otolithic plates and their pressure on the cell hairs excite the nerve terminations and that this irritation produces in the centre the conception of the position of the head, we may consider the sacular apparatus of the labyrinth as an organ entirely suitable for the perception of position in space. We seem to be justified in and compelled to this supposition by the above-mentioned facts. Changes in the sensations of the otolithic membranes, which are not accompanied by perceptions of rotation, produce in the centre the conception of progressive movement. After having found the vestibule to be an organ of sense, which brings about the perception of turning by means of the semicircular canals, and that of progressive accelerations—and of the position of the head in space by the otolithic apparatus, I again take the privilege of pro-

posing for this group of perceptions the fitting name "*static sense*." A critical discussion of former papers of Delage, Aubert, Steiner, Baginsky, Preyer a. o. is appended. Baginsky's experiments especially suffer from the failure to prove, that dogs, whose cochlea had been destroyed in its function—and this but partially,—did not also lack the vestibule and the semicircular canals. "This identification of 'entirely deaf' dogs with those without a labyrinth is incorrect." Baginsky's conclusions cannot therefore be accepted.

b.—NASO-PHARYNX.

1. REDARD. Nasal obstructions, principally from adenoid vegetations, in their relations to deviations of the vertebral column and deformities of the chest (de l'obstruction nasale, principalement par les tumeurs adénoïdes dans leur rapports avec les déviations de la colonne vertébrale et les déformations thoraciques). *Gaz. méd. de Paris*, 1890, No. 12.

2. CERVELLO, V. Pulmonary emphysema from occlusion of the nasal passage (enfisema polmonare da occlusione delle vie nasali). *Riforma med.*, 1890, No. 116.

1. REDARD has frequently observed in children, simultaneously with occlusions of the nose, deformities of the vertebral column and of the chest, and he arrives at the following conclusions: 1. Nasal occlusion is a frequent cause of cyphosis and scoliosis. 2. Scolioses, dependent upon nasal affections, are mostly dorsal (?) with long curvature, frequent in women, and develop principally during the period of growth. 3. Adenoid vegetations play a more important part than the true tonsils. 4. Hypertrophy of the pharyngeal tonsil is the frequent cause of nasal occlusion. 5. Treatment of nasal obstruction rapidly improves many forms of cyphosis, scoliosis, and deformity of chest.

2. In dogs, whose nostrils were completely occluded by operation, pulmonary emphysema developed in a short time.

b.—PATHOLOGY AND THERAPEUTICS.

By A. HARTMANN.

a.—GENERAL LITERATURE.

1. LUDEWIG. Report on the work done at the Royal University Policlinic at Halle from April 1, 1889 to March 31, 1890. *Arch. f. Ohrenheilk.*, vol. xxxi., p. 31.

2. HOFFMANN, EGON, Greifswald. Thirty-five cases of otitis media following influenza. *Deutsche med. Wochenschr.*, 1890.
3. SZENES, SIGISMUND, Budapest. Notes on the diseases of the ear during the late influenza epidemic. *Monatsschr. f. Ohrenheilk.*, etc., No. 11, 1890.
4. LUDEWIG. Influenza otitis. *Arch. f. Ohrenheilk.*, vol. xxx., p. 204.
5. SZENES, Budapest. The therapeutic value of some new remedies used for aural affections. *Therapeutische Monatsschr.*, No. 10, ff., 1890.
6. PATRZEK, Oppeln. Pyoktanin in otology. *Allgem. med. Central Zeitung.*, No. 63, 1890.
7. BATTLE, W. H. Some points relating to injuries of the head. Hunterian lectures at the College of Surgeons. *Lancet*, July 5 and 12, 1890.
8. MYGIND, HOLGER, Copenhagen. Contribution to the knowledge of hereditary syphilitic deafness. (Bidrag til Kendskabet til den heredosyphilitiske Døvhed.) *Nord. med. Arkiv.*, vol. xxvii., No. 7.
9. MÜLLER, JULIUS, Hamburg. Reading of deaf-mutes. Guide to the study of the art of lip-reading. Published by himself.
1. The attendance at the aural university clinic at Halle increased to 1623 patients, with 2014 different forms of diseases, of whom 179 were treated in-doors at the stationary clinic. Aristol and pyoktanin were given a careful trial. These new remedies were not found, however, to be worthy of recommendation. Chiselling of the mastoid process was performed in 62 cases. LUDEWIG fully describes the fatal cases (7). The third case of chronic suppuration with polypus and caries is of special interest, because the operation was the immediate cause of death. After extraction of the malleus and incus the mastoid was chiselled. "At the depth of $1\frac{1}{4}$ cm. the middle cerebral fossa was opened, although the chisel was directed anteriorly and upward below the linea temporalis on a level with the spina supra meatum." In spite of immediate antiseptic dressing the patient died on the seventh day with symptoms of meningitis. At the autopsy a defect, the size of a pin-head, was found in the dura at a point corresponding to the trephined opening below which coagula and osseous splinters were found lying upon the bone. In the surrounding dura and pia mater intense redness and hemorrhages. In the temporal lobe

"an accumulation, about the size of a hen's egg, of soft, putrid, dark-red masses." No suppuration found in or about the brain.

RUMLER, Berlin.

2. HOFFMANN, at the Medical Society of Greifswald, reported thirty-five cases of middle-ear disease following influenza. They all turned out favorably without affecting the mastoid process. The discharge was mostly serous or sero-mucous, rarely purulent. In six cases both sides were affected simultaneously; in four cases ecchymoses and blood blisters were seen on the drum-head. In one case there existed besides the middle-ear affection empyema of the frontal sinus (diagnosed from frontal headache, pain on pressure upon the frontal region, and discharge of muco-purulent secretion from the middle nasal meatus after cocainization of the nose). It healed in about two weeks, the nose being permanently treated with cocaine. From two cases examined bacteriologically, and from the clinical course of the disease, the author is inclined to believe that the latter is not produced by the hypothetical specific influenza bacteria, but by streptococci, the development of which is favored by the influenza infection.

ZARNIKO, Berlin.

3. SZENES gives an abridged review of all the papers which treat of aural diseases due to influenza. It was seen that the middle ear was the principal seat of the disease, which was of an acute catarrhal or purulent nature. The bacteriological examination did not prove the existence of a constant characteristic micro-organism in the tympanic secretions, but several were found which are known to occur also in small numbers in the ear under normal conditions. It seems at any rate to be justifiable to consider this form of otitis media as the result of infection. Szenes himself has observed 44 cases, among which were 3 with catarrh of the Eustachian tubes, 8 with "catarrhus cavi tympani acutus," 28 with acute inflammation of the tympanic cavity, 3 with acute eczema of the external meatus, 4 with periosteal phenomena at the mastoid process, which were relieved by energetic antiphlogosis and iodine applications.

KILLIAN, Freiburg.

4. LUDEWIG, in the cases observed at the clinic at Halle, found nothing characteristic of influenza. One fatal case: acute caries of the mastoid process, which ended fatally by pyæmia in spite of chiselling.

-RUMLER.

5. SZENES discusses menthol, aluminium acetico-tartaricum, sublimate, aluminium aceticum, carbolic glycerine, creoline, iodol

bismuthum salicylicum, aristol, boric acid, lactic acid, cocaine, and massage. We emphasize from the somewhat elaborate paper the following points: Menthol does not act as favorably in furunculosis as it has been asserted by Cholewa, but the treatment is convenient and worthy of recommendation. The author confirms the favorable action of aluminium acetico-tartaricum, sublimate, and aluminium aceticum in furunculosis, of carbolic glycerine at the initial stages of otitis media acuta. Iodol had, according to Szenes, no effect, the otorrhœa in some cases even being rendered more profuse. Aristol is to be recommended in affections of the external meatus, but rejected in suppurations of the tympanic cavity. Boric acid is a sovereign remedy in combatting suppuration of the middle ear, except chronic purulent inflammation of the attic. Massage relieves the pain in acute inflammations of the tympanic cavity and favors absorption.

NOLTENNIS, Bremen.

6. In consequence of Stilling's recommendation of pyoktanin, PATRZEK tried it in aural patients. He treated with the remedy one case of otitis externa acuta circumscripta and one of otitis media acuta purulenta, and also five cases of otorrhœa. The treatment lasted about two weeks. There was no marked improvement. The blue color of the drug prevents its general introduction into otology.

JENS, Berlin.

7. BATTLE, while in the main being in accordance with the view that immediate profuse and continued bleeding from the ear is an important sign of fracture of the middle cerebral fossa, emphasizes the fact that exceptional cases may occur, in which the fracture of the middle cerebral fossa is situated anteriorly to the membrana tympani, and leaves the hearing organ intact. The presence or absence of the bleeding is, therefore, not absolutely pathognostic. Battle, with reference to the watery discharge, is of the opinion that it is due to the escape of cerebro-spinal fluid. The prognosis of these cases is unfavorable, principally when complicated with otitis media of old standing. Battle lays some stress upon the importance of ecchymoses over the mastoid process, which point to the posterior cerebral fossa as the seat of the fracture; he thinks that they usually appear on the third or fourth day after the injury, and that the time of their appearance depends upon the distance from the seat of the fracture.

8. Symptoms characteristic of the disease were present as follows: Previous keratitis parenchymatosa, dental anomalies (Hut-

chinson), vertigo, staggering gait, dulness of the membrana tympani, tinnitus. Deafness appeared suddenly but in one case ; in the others, however, it developed gradually, but quite rapidly. Treatment, local and general (with inunctions of blue ointment, injections of pilocarpine or strychnia) were of no avail. The author arrives at the conclusion that the affection was principally labyrinthine, and the affection of the middle ear was of secondary importance.

VICTOR BREMER.

9. This book of the teacher of speech has for its purpose to teach lip-reading to deaf persons by auto-instruction. The necessary systematic exercises are carefully given.

b.—EXTERNAL EAR.

10. BING, ALBERT, Vienna. Idiopathic acute periostitis of the external meatus. *Wiener med. Blätter*, 1890, No. 37.

11. EITELBERG, A., Vienna. Chronic circumscribed inflammation and polypus of the external meatus from pressure of a ceruminal plug. *Wiener med. Presse*, 1890, No. 39.

12. GRAHAM, H. *Mucor corymbifer* in the external auditory meatus. *Lancet*, December 27, 1890.

13. KESSEL, Prof., Jena. Foreign bodies in the ear. *Correspond.-Blätter des allgem. ärztl. Vereins in Thüringen*, 1890, No. 9.

14. HOWE, LUCIEN. On the removal of a bullet from the ear with the assistance of the galvano-cautery. *Trans. Amer. Otol. Soc.*, 1890.

15. HILDEBRANDT. Second case of injury to the bulbus venæ jugularis internæ by paracentesis of the membrana tympani. *Arch. f. Ohrenheilk.*, vol. xxx., p. 183.

10. An abscess formed in the external meatus with intense fever and pain, extending from the upper wall close to the membrana tympani, which was covered down to its inferior third. On the fifth day spontaneous opening of the abscess took place ; recovery after three weeks. The hearing faculty was normal during the entire duration of the affection, but up to the recovery peritostitic irritation had taken place in addition along the entire zygoma.

POLLACK, Vienna.

11. In a patient with pain in the ear for two months, a fluctuating and sensitive tumor, of the size of a pea, appeared at the antero-inferior wall of the external auditory meatus. The inner

portion of the meatus was filled with cerumen, after the removal of which a polypoid proliferation, which was 5 mm long, 3 mm wide, flattened, and highly red, appeared at the postero-inferior wall. The tumor at the entrance of the external auditory meatus disappeared after two days. The polypoid growth disappeared in three weeks after two cauterizations with chromic acid.

POLLACK, Vienna.

12. GRAHAM briefly reports an observation made in a young Moslem woman at Beirut (Syria). After removal of a plug the patient disappeared entirely from observation. The growth was found to be mucor corymbifer, and the diagnosis was confirmed by cultivation experiments. The fruit hyphæ were colorless, the sporangia covered by a smooth-looking, transparent membrane; the sporangia leaves branched out in the usual umbelliferous manner; the spores were small, colorless, oval, and densely packed together.

13. KESSEL gives a description of the conditions relative to the removal of foreign bodies from the ear, as suited for the general practitioner. With reference to the removal by means of instruments, Kessel proceeds according to his own methods. If a foreign body is wedged in a perforation of the membrana tympani, the opening is extensively enlarged, and the foreign body is either pushed out by injections of lukewarm water through the Eustachian tube, or extracted by instruments. Kessel excises, if these are of no avail, the drum membrane and the malleus in order to facilitate the extraction. If this is without success, the tympanum is laid bare up to the tegmen. Kessel does not consider the ablation of the auricle as sufficient for the removal of a foreign body from the tympanum with a swollen external meatus. The chiselling of the posterior wall of the meatus up to the tympanum is not permissible on account of a possible injury to the facial nerve and to the horizontal semicircular canal. On account of an observation, in which during the extraction of a foreign body the cutis and periosteum of the postero-superior wall of the external meatus and a portion of the cartilaginous meatus was pulled off the osseous canal without occluding the entrance into the tympanum in the least, Kessel arrived at the conclusion, in case of an *indicatio vitalis*, to sacrifice as much of the soft parts of the meatus as is obstructing the access to the tympanic cavity.

14. In a case of a bullet impacted in the external meatus, HOWE used a platinum wire heated to such an extent that it

buried itself in the substance of the lead. When allowed to cool it was found attached to the bullet, and traction brought it near the outlet of the meatus. Two holes were then burned above and below on the surface of the ball, sufficiently deep to afford a hold for the teeth of the forceps, and by this means the extraction was completed.

SWAN M. BURNETT.

15. In this, as well as in Ludewig's case, the intense hemorrhage could be stopped by plugging the internal meatus. After recovery, which took place without reaction, a bluish-red bulging was observed in the postero-inferior quadrant, which was influenced by pressure upon the vena jugularis interna.

RUMLER.

C.—MIDDLE EAR.

16. KOEBEL, Stuttgart. Indiscriminate treatment with powders in suppurations of the middle ear. *Würtemb. Corresp.-Blätt.*, 1890, No. 26.

17. EDWARDS, W. J. Ear complications from chronic catarrhal inflammations of the nose and throat. *Four. Amer. Med. Asso.*, October 4, 1890.

18. LOEWE, LUDWIG, Berlin. Disinfecting tampons in the meatus. *Monatsschr. f. Ohrenheilk.*, 1890, Nos. 6-8.

19. LOEWENBERG, Paris. Contribution to the treatment of sclerosis of the middle ear. *Deutsche med. Wochenschr.*, 1890, No. 28.

20. Prof. BÜRKNER. On the misemployment of Politzer's method in the treatment of aural diseases. *Berliner klin. Wochenschr.*, 1890, No. 44.

21. GELLÉ. Otitis and facial paralysis. Hearing and facial paralysis; innervation of the tympanic muscles. (Otitis et paralysie faciale. Audition et paralysie faciale; innervation des muscles tympaniques.) *Annales des malad. de l'oreille*, etc., November, 1890.

22. THIES. Two cases of necrosis of the cochlea. *Arch. f. Ohrenheilk.*, vol. xxx., p. 185.

23. LUDWIG. Contribution to the knowledge of caries and extraction of the incus. *Arch. f. Ohrenheilk.*, vol. xxx., p. 263.

24. STEINTHAL, Stuttgart. The operative treatment of suppuration of the middle ear and mastoid process. *Würtemb. Corresp.-Blätt.*, 1890, No. 23.

25. HOFFMANN, EGON, Greifswald. Contribution to cerebral surgery. *Deutsche med. Wochenschr.*, 1890, No. 48.

26. PATTERSON, R. G. A contribution to the study of the intracranial complications of chronic otitis media. *Dublin Med. Four.*, July, 1890.

16. KOEBEL warns the general practitioner against the treatment with powders in suppurations of the middle ear, laying down the well-known principles for it. With reference to the powdered boric acid, Koebel agrees with Schwartze's views, but he also admits its use in acute suppurations, if the conditions are favorable to discharge, if no complications are present, and if the case is carefully watched by the attending physician.

ERHARD MÜLLER, Stuttgart.

17. EDWARDS reports cases of ear trouble associated with affections of the nose and throat, as follows: 1. Man of fifty, with fibromata in the nose with hardness of hearing, removal with galvano-cautery. Hearing restored. 2. Case of mastoid abscess associated with nasal catarrh of long standing. Mastoid opened. Patient recovered. 3. Catarrh of nose and throat of one year's standing, followed by acute otitis media and mastoiditis. Opened mastoid, evacuated pus. Patient recovered. 4. Fibroid polypi of nose associated with marked deafness. Removed them by Ronze's operation. Hearing restored.

SWAN M. BURNETT.

18. LOEWE's method of simply plugging the external meatus with cotton, formerly devised by him (*Monatsschr. f. Ohrenheilk.*, 1888, No. 10), is suited only for the treatment of serous catarrhs of the tympanic cavity, which are said to be cured thereby in from two to four days. In mucous and muco-purulent discharge Loewe proposes the following procedure: plugging with oiled cotton for twenty-four hours, irrigations, careful drying with cotton, insufflation of boric acid under strong pressure (double balloon), the tip of the insufflator being brought close to the perforation, in order to blow the powder into the tympanum and to form a veil-like lining; then plugging with dry absorbent cotton, which should be pushed through the perforation into the tympanum. In the beginning daily, then rarer, repeating of the procedure, until the discharge has disappeared and the mucous membrane of the middle ear has become pale. Loewe leaves the plugging for weeks in the ear, and afterwards finds at times old perforations closed. Besides this "disinfectant" plugging, he employs in affections of

the external meatus a "medicated" one—*i. e.*, he saturates the cotton with suitable drugs. When drying is expected, an oiled or collodium plug is placed on top of the other.

G. KILLIAN, Freiburg.

19. In view of the fact that in sclerotic affections of the middle ear the trouble may be aggravated by undue pressure from the air-douche, by tension of the drum membrane and the ossicular joints and bands, LOEWENBERG recommends the occlusion of the external meatus during inflation, causing the patient to press the finger firmly into the diseased ear, or even into both ears. In addition we may exert direct pressure by attaching to the rubber balloon two rubber tubes, which, inserted into one or both ears, exert, simultaneously with the inflation of air into the tubes, a pressure upon the external surface of the drum membrane. As to the drug to be applied, bromethyl has had no effect, according to Loewenberg; he employs iodine vapors, which are aspired into the rubber balloon from a bottle containing iodine. The patients suffering from sclerosis experience a sensation of warmth from the inflation of the vapors of ether, chloroform, and bromethyl, those with other aural affections a sensation of cold.

20. BÜRKNER warns against the indiscriminate use of Politzer's method by physicians and laymen, and justly prompts its restriction. "Poltzer's method is generally indicated only in childhood, in the acute catarrhal affections of the middle ear, in suppurations of the tympanic cavity with perforations of the membrana tympani, and in chronic catarrh of the middle ear without sclerosis if both ears are implicated. In adults we decidedly always prefer the catheter, unless its employment is rendered difficult or impossible by local conditions or the general health of the patient."

RUMLER.

22. THIES makes from his cases the following inferences: 1. That total facial paralysis may be completely restored to normal conditions after removal of the cochlea and cure of suppuration (Case 1). 2. That the facial paralysis may persist after the casting off of cochlea and ceasing of suppuration (Case 2). 3. That in the diseased ear absolute deafness takes place. 4. That vertigo and subjective noises persist, although in less a degree.

RUMLER.

23. In a former paper (*Arch. f. Ohrenheilk.*, vol. xxix., p. 241), LUDEWIG reported 32 cases. At the examination of his operated cases after one year Ludwig found improvement of hearing in 16,

impairment in 3, and no change in 9 cases ; 4 cases did not undergo a re-examination. The final result, concerning the suppuration, remains unchanged. The number of cases has increased to 75. In the new 43 operated cases the result is therefore as follows : Suppuration cured in 22, not cured in 5, under treatment in 9, unknown result in 5, exitus lethalis in 2 cases. The condition of the ossicles was as follows : malleus normal, incus carious in 12 ; malleus carious, incus carious in 25 ; malleus carious, incus (?) in 2 ; malleus carious, incus normal in 1, extraction failed in 3 cases.

RUMLER.

24. STEINTHAL, after considering six histories of cases, discusses the indication for the operation. Steintal is of the opinion that it is not popular enough and is frequently considered too dangerous. He agrees with the views of Küster and Koerner that the bone affection is more frequently the primary disease than has been heretofore supposed. He thinks this also to be the case in two of his cases, while the reviewer does not agree with this view. He lays down the rule that "in all cases of suppuration in which primary suppurative catarrh of the tympanum cannot be positively diagnosed, the mastoid process should be opened when purulent discharge from the ear is present." Steintal expects from the operation more rapid recoveries than heretofore, if it is undertaken in order to thoroughly remove the diseased bone according to general surgical principles.

ERHARD MÜLLER, Stuttgart.

25. Of the three cases two are of interest to the aurist. 1. Otitis media purulenta dextra, perforatio spontanea, empyema antri et cell. mastoid., pachymeningitis purulenta following influenza. After chiselling the mastoid process the osseous portions above the suppurating dura were entirely removed (about the size of a silver dollar). *An abscess in the cerebral substance of the occipital lobe was discovered*, which had not been diagnosed before on account of the lack of characteristic symptoms. Drainage and plugging with iodoform gauze. Exitus : complete recovery in about nine weeks. 2. Extensive cholesteatoma of the mastoid process and of the adjoining parts of the occipital bone, extensive extradural abscess. Chiselling of the mastoid process, of the postero-external angle of the parietal bone, of a portion of the occipital bone with exposure of the transverse sinus. Exitus : Complete recovery, restoration of an approximately normal hearing distance.

ZARNIKO (Berlin).

26. In this paper an elaborate report of a fatal case is communicated, at the autopsy of which septic softening of the thrombus in the lateral sinus and subsequent detachment of emboli were found to have been the causes of pyæmia. PATTERSON calls attention to the variability of the location of the lateral sinus, and he believes that Barker's line ought to be raised fully three quarters of an inch higher than it has been recommended by Barker.'

d.—NERVOUS APPARATUS.

26a. GRADENIGO, Turin. Subjective noises in otitis interna. *Allgem. Wiener med. Zeitung*, 1890, No. 36.

26b. GRADENIGO. Subjective ear noises in otitis interna. (I Rumori subiettivi del orecchio nell' otite interna.)

27. BUSS, G., Darmstadt. Contribution to the knowledge of aural affections in traumatic neurosis in consequence of railroad accidents.

28. GRADENIGO, Turin. Affection of the acoustic nerve in nephritis (Affezione del nervo acustico nella nefrite). *Il Sordomuto*, 1890, No. 5.

29. HABERMANN, J., Prague. Communication of cases: 1. Hemorrhages into the labyrinth in consequence of pernicious anæmia. 2. Hemorrhages into the labyrinth in consequence of ordinary anæmia. *Prager med. Wochenschr.*, 1890, No. 39.

30. OGSTON, ALEXANDER. On unrecognized lesions of the labyrinth. *Lancet*, July 19, 1890.

26a and 26b. GRADENIGO publishes the full history of an intelligent female patient with an aural affection associated with intense and distressing subjective noises, and adds some explanatory remarks. We emphasize Gradenigo's warning against an attempt to remedy the affection by means of Lucae's "tone cure" and Brenner's electric treatment, since his experience with both measures was of a very unfavorable nature. NOLTENNIS.

27. BUSS reports the history of a patient in whom, in consequence of a railroad accident, besides other severe symptoms of traumatic neurosis, various disturbances of the hearing organ developed. Buss states his views as follows: that the aural affection in traumatic neurosis depends upon a central disease, probably situated in the temporal lobe, with considerable diminution or destruction of the bone-conduction, based upon decrease

of the specific energy of the acoustic nerve as a partial phenomenon of a general nervous concussion. Diminution of hearing, appearance of tinnitus, vertigo, and headache are associated with it. The progress is unfavorable.

28. The case reported by GRADENIGO demonstrates the fact that in nephritis, as in cerebral tumors, changes in the peripheric terminations of the acoustic nerve may be present, corresponding to those observed in the terminations of the optic nerve. These may develop in the beginning without marked functional disturbances.

30. OGSTON, in this paper, draws attention principally to a condition which is not unfrequently observed in gouty and rheumatic persons, and which is principally characterized by the sudden appearance of deafness and tension in the ears, of tinnitus, and of disturbance of the musical sense; furthermore of a sensation of general uneasiness, which is greatly increased by sudden movement of the body. There exists but slight or no real pain, and the attack may gradually disappear in the course of a week, leaving slight diminutions of the musical hearing and a predisposition to new attacks. Ogston considers this condition to be analogous to glaucoma in the eye; he recommends absolute rest, firm plugging of the ears with cotton, and in some cases subcutaneous injections of pilocarpine. Some quite useful diagrams were exhibited and suggestions made with reference to the construction of maps for acuteness of hearing, referring to the principles laid down by Helmholtz and Donders for the examination of the eye. Some test maps were demonstrated.

c.—NOSE AND NASO-PHARYNX.

31. SCHÄFFER, Bremen. Abscesses of the nasal partition wall. *Therapeutische Monatsh.*, 1890, No. 10.

32. DIETRICH, JOSEPH, Elbing. Ulcus septi nasi perforans. *Mon. f. Ohrenheilk.*, 1890.

33. SCHMIEGELOW, E., Copenhagen. Cystopneumatik Omdunelse of concha media. *Ugeskr. f. Læger.*, 1890, No. 9.

34. MEYJER, POSTHUMUS. The most common cause of nose-bleeding and its treatment (De meest voorkommende Oorzaak van Neusbleeding en hare Behandeling). *Nederlandsch Tijdschrift voor Geneeskunde*.

35. BONNE. Contribution to the treatment of certain chronic

nasal affections, with the use of galvano-cautery. *Therap. Monatsch.*, 1890, Nos. 8 and 9.

36. LÖRI. Contributions to the treatment of naso-pharyngeal and laryngeal diseases. *Allg. Wiener med. Zeitung*, 1890, No. 44.

37. HÖFFINGER. Vibration massage of the nasal and naso-pharyngeal mucous membrane. *Allg. Wiener med. Zeitung*, 1890, No. 44.

38. BLOCH. Mechanical aids to human breathing. *Wiener med. Wochenschr. a. ff.*, 1890.

39. WAGNIER, Lille. Caseous coryza. Cholesteatomatous rhinitis (Coriza caséeux. Rhinite cholestéatomateuse). *Revue mens. de laryngologie, d'otologie, etc.*, 1890, No. 20.

40. ZIEM, C. Contribution to the diagnosis of nasal suppuration in general. Remarks upon the so-called Tornwaldt's disease. *Mon. f. Ohrenheilk.*, etc., 1890, No. 7.

41. BRESGEN. Further communications upon the use of pyoktanin (methylineviolet) in the nose and throat. *Therapeutische Monatshefte*, 1890, No. 10.

42. SCHEINMANN. Pyoktanin for tuberculous ulcerations in the larynx and in the nose. *Berliner klin. Wochenschr.*, 1890, No. 33.

43. BRESGEN. Dry treatment of the nose and its accessory cavities. *Berliner klin. Wochenschr.*, 1890, No. 39.

44. SCHÜTZ, G., Mannheim. Contributions to the knowledge of empyema of the antrum of Highmore. *Mon. f. Ohrenheilk.*, 1890, No. 7.

45. LICHTWITZ. The diagnosis of latent "empyema of the antrum of Highmore by means of the irrigation trocar." (Du diagnostic de l'empyème "latent" de l'antré d'Highmore par le lavage explorateur. *Bulletin Médical*, 1890, No. 86.

46. ZIEM. Translucidation of the antrum Highmori. *Berliner klin. Wochenschr.*, 1890, No. 36.

47. VOHSEN. The translucidation of Highmore's antrum and of the frontal sinus, and their affections. *Berliner klin. Wochenschr.*, 1890, No. 46.

48. SREBERNY. Contribution to the study of translucidation of Highmore's antrum in its empyema. *Berliner klin. Wochenschr.*, 1890, No. 46.

49. SCHÄFFER, M. Report of 1,000 cases of adenoid vegetations. *Wiener med. Wochenschr.*, 1890, No. 49 a. ff.

50. PATRZEK, OPPELN. Adenoid vegetations of the naso-pharynx in adults. *Deutsche medicinal Zeit.*, 1890, No. 75.

51. CALMETTES, R. and LUBETT-BARBON. (Nouveau procédé pour opérer les végétations adénoïdes du pharynx nasal chez l'enfant.) New procedure for operating on adenoid vegetations of the naso-pharynx in children. *Gazette hebdom.*, 1890, Aug. 20.

52. STEWART, W. R. H. Adenoid growths in the naso-pharynx. *Lancet*, 1890, Sept. 20.

53. MEDERNACH, W. Hypertrophy of the pharyngeal tonsil and its treatment. *Inaugural Dissertation*.

54. FELICI, FR., Rome. Rapid extirpation of a naso-pharyngeal fibroma. *Arch. ital. di Laringologia*.

31. SCHÄFFER in abscesses of the nasal partition wall recommends to combine with the incision the excision of an elliptic portion of the mucous membrane and perichondrium, then to scrape out the cavity with the sharp spoon, and finally to plug it with iodoformized gauze.

NOLTENNIS.

32. DIETRICH derives the development of the simple perforating ulcer from the peculiar circulation of the mucous membrane of the cartilaginous septum, in which five arteries are concerned. In consequence of the numerous anastomoses the circulation is not rapid in the arteries of this part, and is even less so in the veins, which readily form varicosities and thus cause bleeding. Thrombosis of the varicosities may also develop, the extension of which leads to nutritive disturbances and finally to disintegration of the tissue. In this manner an ulcer develops, which bears a certain resemblance to the *ulcus ventriculi*. *Staphylococcus pyogenes aureus* and *streptococcus pyogenes* are not, as it is asserted by Hajek, the cause of ulceration, but later intruders.

G. KILLIAN.

33. SCHMIEGELOW describes three cases of formation of "osseous bulbs" in the concha media, two of which were in the right and one in the left nostril. The patients were females, 33, 40, and 46 years of age. The most prominent symptom is intense headache. The treatment consists in the operative removal by means of the galvano-cautery, scissors and forceps. In one case the microscopical examination of the inner wall of the cyst revealed ciliated cylindrical epithelium.

VICTOR BREMER.

34. After a brief historical synopsis MEYER enters more fully into the etiology and diagnosis of epistaxis. The author agrees with Hartmann, Michel, Kiesselbach, etc., that in the greater number of cases the cause of epistaxis is to be looked for in the bursting of small varicose vessels at the septum narium, viz., anteriorly at the boundary between cartilage and bone. The author prefers chromic acid to all other remedies. He reports 25 tabulated cases treated with chromic acid, 23 of which were after one cauterization absolutely free from relapses. In one case epistaxis occurred later from the other nostril, but ceased after one cauterization. In one case there was a small vessel, which had not been cauterized the first time by the chromic acid, and which was the cause of a relapse.

JENS, Berlin.

35. BONNE uses, with good results, in chronic nasal swellings and their sequelæ and complications, injections of equal parts of tannic acid and glycerine, to be made two or three times a week. The author points out that this method is principally beneficial in country practice, since the absence of a specialist and of suitable instruments makes the rational treatment of these conditions impossible (thermo-cautery, galvano-cautery, cold and warm snare, etc.—REV.). Bonne insufflates by means of a small glass tube to which a rubber tube and a mouth-piece are attached. A few histories illustrate the statements.

NOLTENNIS.

36. The paper proves LÖERI to be a pronounced adversary to radical treatment in chronic nasal catarrh, in empyema antri Highmori, in tonsillar affections, in diphtheria, even in apparently benign laryngeal growths, in the latter "for well-known reasons." Compare the original as to the composition of tinctures, plasters, etc., used by Löeri, the employment of which presupposes a remarkable degree of industry and persistence on the part of the physician and patient.

NOLTENNIS.

37. Thirteen cases, treated by "vibratory massage," mostly of chronic hypertrophic rhinitis, which are said to demonstrate the excellent effect of this method of treatment.

NOLTENNIS.

38. There are according to BLOCH two kinds of respirators, oral and nasal, their transition being formed by the oro-nasal. Inasmuch as the only requisite is the cleansing of the inspired air from dust, etc., nasal respirators are perfectly proper; the oral ones are to be rejected as non-physiological. The nose, with its quadruple functions of warming the air, imbuing it with moisture, cleansing from dust, and warning against the inspiration of harm-

ful gases (eventually by the production of reflexes), is always the best respirator. If after restoration of the nasal breathing mouth breathing habitually persists, Guye's contra-respirator is applicable. Of the nasal respirators, those devised by Feldbausch principally for therapeutic purposes, and those by Wolff, especially as hygienic and prophylactic apparatus, are excellent and worthy of recommendation. The expense, I regret to state, of the "free-air breather," the "knapsack-" and the "moustache-" respirator prevent up to date their extensive use, especially among the laboring class.

NOLTENNIS.

39. WAGNIER's patient, a woman, had suffered for three and a half months from nasal obstruction, when intense pain occurred in the right nasal region, together with purulent discharge from the right nostril and swelling of the hard palate, in which after two weeks two openings formed. The probe when introduced entered the nasal cavity. Right nostril swollen and obstructed; the probe reaches the left nostril through a perforation in the septum. After discharge of a large amount of caseous material from the right nostril the fistulæ of the palate and also the perforation of the septum healed.

40. ZIEM recommends irrigations through the nose with Mayer's force pump for the diagnosis of nasal suppuration, whether it has developed in the nose or in an accessory cavity. We may thus find pus in cases in which we could not find it by rhinoscopia anterior, nor by rhinoscopia posterior. Injections should be made at different hours of the day and on different days. Ziem argues against the objection, that from every nose, even the healthy ones, some matter may thus be removed, by stating that the normal nasal mucous membrane discharges only transparent mucus, and never "yellowish shining or even yellowish-green flakes of pus and lumps of connecting lamina and detritus." These injections may frequently be unsuccessful, for there are cases of suppuration of the accessory cavities which can be recognized only from the offensive odor, perceived by an expert, from the injected fluid. Stained fluids or turpentine when introduced into the antrum could not be demonstrated through the nasal injections. "Tornwaldt's bursitis" never exists alone. In a considerable number of cases, which were treated in vain by others for this affection, suppuration was demonstrated in the nose or its accessory cavities and cured by proper treatment.

G. KILLIAN.

41. BRESGEN has seen nasal wounds heal readily under treatment with pyoktanin, while he formerly frequently observed after operations severe inflammations with their sequelæ.

NOLTENNIS.

42. SCHEINMANN heats the thickened end of his flexible copper probe and takes up the pure pyoktanin cœrul. He rubs the covered probe energetically into the tuberculous ulcer. Scarcely any reaction occurs. Scheinmann reports two severe cases of nasal tuberculosis, one of which was cured six days after operative removal of the tumor-like infiltration, the other after eight days under treatment with pyoktanin.

RUMLER.

43. BRESGEN, according to Krause's recommendation, has during the last few years used dry treatment for nasal affections, and is satisfied with the results. He uses iodol for Highmore's antrum and frontal sinus, soziodolkalium for the interior of the nose and soziodolzink in ozæna.

RUMLER.

44. SCHÜTZ has observed three cases, in which, after extraction of a carious upper molar tooth, suppuration of the antrum Highmori developed in a formerly normal nose, viz., after one day, five days, and two weeks respectively. In the last fully reported case there occurred a few hours after the extraction of the tooth inflammatory symptoms, which pointed to an affection of the antrum maxillare.

G. KILLIAN.

45. LICHTWITZ distinguishes two forms of suppuration of Highmore's antrum : 1. the well-known form with the phenomena of retention of pus ; 2. the one associated with continued or periodical and intense discharge from the nose, which is by far more frequent and the knowledge of which is due to modern rhinology. The author considers the well-known diagnostic signs as unreliable. The only means of determining the diagnosis positively is the irrigation of Highmore's antrum. The author performs it by thrusting a very thin trocar from the lower nasal meatus into the antrum maxillare and connecting it with a syringe. He considers his operation as a "miniature operation" when compared with that devised by Mikulicz.

JENS.

46. ZIEM denies the great value of the method of translucida-tion for the diagnosis of affection of Highmore's antrum, which, after Voltolini's precedence, Heryng, Freudenthal, and especially Vohsen, would like to ascribe to it. On the other hand there is only one reliable means, viz., the exploratory puncture followed by irrigation.

RUMLER.

47. VOHSEN advocates the value of translucidation, and emphasizes its importance in affections of the frontal sinus, which present great difficulties in diagnosis. He believes that "translucidation surely permits the conclusion of the non-existence of an affection." Vohsen has no experience in the living.

RUMLER.

48. SREBERNY confirms, with four cases, the theoretical suppositions of Ziem, that slight suppurations of Highmore's antrum cannot be proven by means of translucidation.

RUMLER.

49. SCHÄFFER distinguishes two kinds of hypertrophy of Luschka's tonsil: 1. Pedunculated tumors, 2. Smooth tumors with broad base like oral tonsils, with longitudinal sulci; the latter form being decidedly more frequent in North Germany. The bursa pharyngea (Tornwaldt) is in nearly all cases the recessus medius. Schäffer mentions, that he succeeds in most cases in removing the hypertrophic pharyngeal tonsil *in toto* with Gottstein's knife. This, however, does not refer to such large specimens ($2\frac{1}{2}$ to 3 cm long, 2 cm wide, and $1\frac{1}{2}$ cm thick) as were observed by Schäffer, on account of the difficulty of introducing a Gottstein knife of corresponding size into the naso-pharynx of the mostly young patients. The complications referred to in this affection are of especial interest. Frequent epistaxis, development of goitre, erysipelatous facial swelling, disturbances of speech, possibly also choreic convulsions, frequent and severe affections of the hearing organ, etc. (Compare upon this point the carefully tabulated statistics.) With reference to the diagnosis, Schäffer considers swelling of the mucous membrane of the nasal floor in its entire length as a wellnigh sure criterion, while the author has too low an estimation of the value of rhinoscopia anterior. In scrofulous patients Schäffer adds general treatment to the operative procedure.

NOLTENNIS.

50. PATRZEK reports four cases of adenoid vegetations in patients of from twenty-eight to forty-two years of age.

51. CALMETTES and LUBET-BARBON operate adenoid vegetations for the last ten months in bromethyl narcosis with a modified Gottstein knife. The narcosis is rapidly induced by strong doses and firm pressing of the mask against the face; no muscular relaxation occurs. When anæsthesia has taken place, they interrupt the narcosis. The instrument is rapidly introduced and the centre is cut off to the right and left. The patient soon awakens from the narcosis.

52. STEWART prefers Gottstein's ring knife, his own fingernail, or Loewenberg's forceps modified by Woakes. He considers chloroform the best anæsthetic. The patient is placed in a perfectly straight position. Otorrhœa may increase after the operation, or an old one may reappear; a slight inflammation of the mastoid process may rarely follow.

53. MEDERNACH describes in his full and elaborate dissertation the operation of adenoid vegetations with Kuhn's forceps.

54. FELICI reports a case of naso-pharyngeal polypus, its pedicle springing from the roof of the naso-pharynx. He succeeded in removing the tumor *in toto* with the galvano-caustic snare.

FIRST MEETING OF THE NORTH GERMAN AURISTS IN BERLIN, APRIL 22, 1889.

Reported by ADOLPH BARTH, of Marburg, and translated by
Dr. J. A. SPALDING, Portland, Me.

On this day the first meeting of the aurists of Northern Germany took place in Berlin, GOTTSTEIN being chosen president and BARTH secretary. The society resolved to become a permanent one, to meet every year, to invite all the aurists of the northern portion of the empire to join in the proceedings, to request the presence of ladies at the social meeting, to solicit without special invitation the attendance of foreign aurists, to meet for the purpose of advancing the science of otology and for friendly acquaintance, and to convene each year at Easter in Berlin.

PROCEEDINGS.

BERTHOLD spoke of the *Cicatrisation of old perforations of the Mt*, recalling his methods of myringoplasty suggested at Cassel in 1878, and reviewing the criticisms of other authors concerning the same. He felt dissatisfied with all that he had as yet accomplished in this province. Last year for the first time he had succeeded in improving his method of skin-grafting until he was now as positive of closing over old perforations, as of obtaining perfectly granulating surfaces on wounds on any other part of the body. After the suppuration has ceased, and he has loosened any adhesions between the edge of the perforation and the opposite wall of the tympanum, he places on the granulating mucous surface of the promontory a bit of skin precisely the size of the perforation, and of a thickness equal to the distance between the margin of the perforation and the inner tympanic wall. The surface of this skin as will be then seen fits into the margin of the perfora-

tion as a watch glass into the groove of the rim. The granulating mucous membrane affords the material for the nourishment of the transplanted skin, whilst the secretion which oozes out around the margin of the skin, ties the latter down to the edges of the perforation.

The hearing was not affected by this procedure, except to be improved in nearly every case.

The cornea of rabbits and the skin of frogs were also employed in these experiments, but without success. Transplantation with human cuticle proved successful in Berthold's hands in closing over the largest perforations, even to entire absence of the *Mt*.

When the perforations are very small and do not heal with human skin, the author resorts to the egg membrane, wetting it repeatedly with turpentine at intervals of several minutes after once laying it over the orifice of the perforation. This little procedure renders the membrane very transparent, so that we can see how the turpentine irritates the *Mt* and how the marginal growth extends and the perforation diminishes in size. Whenever the patient perceives the least pain from the application of the turpentine, the author ceases to moisten the graft and does not reapply the turpentine till the following day. This carefully followed up, irritation of the *Mt* gradually diminishes the size of the perforation until in a few weeks it is completely closed, whereupon the egg membrane is in its turn exfoliated.

During the discussion Berthold was asked at what period of the chronic suppuration he began to insert the bits of skin. The mucosa of the promontory generally granulated only so long as it suppurated, and after the suppuration was suppressed the mucosa was covered with epithelium and had ceased to granulate. It was impossible to understand how the skin could be transplanted during that stage. If, on the other hand, the mucosa were still secreting, a condition in the author's opinion indicating the very essence of the attachment of the graft, suppuration was still present and would inevitably prevent the adhesion of the graft. Other members spoke of the frequent diminution of hearing produced by all these methods of transplantation. Hartmann had seen extensive inflammation, Truckenbrod had accidentally had an opportunity to examine one of Berthold's cases a long time after the operation, and to satisfy himself of the successful result, though the perforation was not wholly cicatrized.

WALB read a paper on *The pars ossea of the external tympanic wall,*

and the great clinical and diagnostic importance of the alterations which take place in that region. Up to this time the appearances and condition of the *Mt* have solely been considered in making our diagnosis. This may be well enough for a *portion of the chronic cases*, but for all of the *acute cases* and a large portion of the *chronic cases* the condition of affairs at the pars ossea must be borne in mind. This region rises laterally from the margo tympanicus, which at the upper half of the *Mt* projects forward into the meatus, forming a broad semilunar surface. The gap between the margines tymp. is filled with this bony plate rising from the squamous portion of the temporal bone, and with the margo would form a perfect half-moon were it not for the Rivinian foramen. This bony portion of the external tympanic wall is the first to form the attachment of the *Mt* to the upper wall of the meatus, and on account of its importance deserves a special name.

The inflammatory alterations in acute inflammations of the *Mt* and tympanum are revealed earlier on the pars ossea than farther downward, owing to the fact that the vessels of the *Mt* lie in a gore running from above downward, and of course exhibit injection and swelling in the larger vessels higher up than farther below, where the network of vessels is so much more delicate. If we at this period in the disease examine the *Mt* we find but the slightest of alterations. Auscultation will now give the differential diagnosis between an otitis externa located in this region, or the momentary redness of a temporary injection. This condition of affairs becomes much more important for diagnostic purposes when an ear becomes once more affected with an acute inflammation of the *Mt* or tympanum in which an inflammation had been present in former years. For under such circumstances we often find the pars flaccida adherent to the neck of the hammer, as well as very tense folds arising from the short process. In such cases there will be no injection or swelling in the *Mt*, because the vessels in the cicatrix lying on the pars flaccida are either entirely empty or else diminished in calibre. If this is the state of affairs we shall see the injection and swelling on the pars ossea alone, and from here gradually making its way around the periphery of the *Mt*, without actually infringing upon its surface. Nevertheless we may here have before us the actual picture of otitis media acuta—constant, violent pain, feverishness, etc., etc. We are surprised that we discover no alterations with the mirror, we try to console ourselves with the idea of some incipient otitis externa,

and only after examining the tympanum do we get any clue to the exact state of affairs, in that paracentesis of the *Mt* releases a large amount of serous fluid and the urgent symptoms at once abate.

All that has so far been said refers to the *cutis* of this region, but the *pars ossea* additionally plays an important rôle in all cases of the so-called perforation of Schrapnell's membrane, since the latter is almost invariably connected with caries of the *pars*. We find large defects extending to the upper wall of the meatus, through which the entire cupola of the tympanum lies open to view, whilst in total loss of the membrane the head of the hammer is often seen lying free.

The *pars ossea* is also frequently the seat of exostoses, sometimes more than one, with similar growths in the meatus in front of the *Mt*, in the form of globules lying opposite one another.

In the discussion which followed, most of the members present agreed with what Walb had said, but they thought the name was hardly happily chosen, and that it would be difficult to separate the region anatomically from its surroundings.

HARTMANN presented a patient with *total adhesion of the soft palate to the posterior pharyngeal wall*, in whom an operation ten months before had resulted in a permanent artificial opening. The adhesions were due to syphilis. The movements of the palate had been but slightly disturbed, so that speech had remained perfectly pure. The operation consisted in freeing the spots of attachment, and suturing the margins. The introduction of firm foreign bodies to prevent reunion could not be borne by the patient. The opening remained sufficiently patent to allow respiration and removal of secretion from the naso-pharynx by hawking.

WALB mentioned several cases of extreme stenosis in the pharynx, with adhesions between the soft and the hard palate, and between the two latter and the pharynx, due to excessive and unskilful use of the galvano-cautery or Paquelin's cautery, both by surgeons and specialists in throat diseases. Pharyngitis granulosa cannot be cured in one sitting, without leading to contact and union of the cauterized surfaces.

HARTMANN then reported *an attempt to make an artificial opening in a case of congenital occlusion of the external auditory meatus*. The case was that of a patient, aged twenty, with an auricle well formed all but the helix. The tuning-fork test demonstrated that hearing

was present. A current of air could be heard forcibly entering the tympanum during catheterization. The auricle was loosened from its insertion and bent forward, and a raspatory pushed in, as is often done in cases of foreign bodies in the meatus. It was then discovered that the pars tympanica was entirely absent, and that the head of the inferior maxilla lay on the anterior surface of the mastoid process. Tampons pressed into the posterior wall whilst the mouth was shut could not be removed till the mouth was opened. The incision was sutured and healed by first intention.

The operation showed : 1. That in congenital absence of the external meatus it is not appropriate to undertake an operation at the spot where the meatus ought to be, on account of the danger of injuring the inferior maxillary articulation. 2. The presence or absence of the osseous meatus can most precisely and with the least danger be determined by loosening the auricle from its attachment in the manner sometimes necessary in removing foreign bodies from the meatus.

MOLDENHAUER, in the discussion, urged those present not to operate in cases of congenital occlusion of the meatus, because the tympanum, with its adnexa, is almost invariably deformed on such occasions. The prognosis and diagnosis depend on the condition of the face and jaw, which are developed simultaneously with the organ of hearing.

The remainder of the session was occupied with the demonstration of instruments (palate hooks, etc.) and anatomical specimens (contracted Highmore's antrum and some interesting rhinoliths).

REPORT OF THE SECOND MEETING OF NORTH GERMAN AURISTS, BERLIN, APRIL 7, 1890.

Translated and abridged by Dr. J. A. SPALDING, Portland, Me.

1. After transaction of business matters, the first paper was read by TRUCKENBROD : *Diabetes : a hitherto unobserved symptom of meningitis, especially in those forms originating in the ear.*

The history of the case was this : A young physician suffered from influenza and acute otitis media. Perforation of Schrapnell's membrane and of the *Mt* ; paracentesis liberated a profuse serous accumulation. Cerebral symptoms severe, but remitting from time to time for several days. Opening of mastoid ; cavity healthy. At the beginning of the fourth week sugar was discovered in the urine. Death on the twenty-fifth day from the beginning of the otitis, with all the symptoms of diabetes. The autopsy verified the diagnosis. In support of the cerebral origin of the melituria, Truckenbrod specially mentions that the fourth ventricle was filled with a sero-purulent liquid.

During the discussion BERTHOLD reported a case of severe otitis media in which sugar in the urine was not discovered in the acute stage of the otitis, but during the convalescence.

2. The next paper was by BERTHOLD on *The optical representation of the movements of the memb. tymp.*

It is well known that tense membranes are easily excited into vibrations by the sound-waves of the surrounding air. Thus if we hold a vibrating tuning-fork in front of a tense membrane strewn with sand, the sand will begin to dance. If we hold in our hand a ring across which a thin membrane has been tightly stretched, and then bring the ring close to a vibrating tuning-fork, we can distinctly feel the vibrations with the hand.

This experiment of J. Müller's proves that the vibrations of membranes easily extend to the firm bodies with which they may

be connected. The drum membrane of the human ear, owing to its form, propagates sound more efficaciously than any other membrane. For, as Helmholtz has shown, the resonance of curved membranes is immensely superior to that of those that are flatly stretched. For this reason then, the vibrations of the *Mt* will also easily extend to the annulus tympanicus within which it is spread. And this propagation of sound will in many instances be of great importance for the hearing, as I have suggested in my paper on *What can the human ear perceive without the stapes?*

While investigating the conduction of sound through the bones of the head, as far back as 1872, I succeeded in optically representing the movements of my own drum-head. For that purpose I made use of a short T-shaped tube, one end of which I fixed hermetically in the meatus, the second by means of a rubber tube I affixed to a gas pipe, and the third end was drawn out to a fine gas jet. A cock affixed to the rubber tube then permits the gas flame to be turned higher or lower at will.

The flame will burn steadily if not directly or indirectly agitated by waves of sound. But if with closed lips we produce a sound in the mouth so that the bones of the head resonate in sympathy, or if we press a large vibrating tuning-fork against the bones of the head, the vibrations will be transmitted to the *Mt*, and from that to the gas in the meatus, and thereupon the flame at the end of the T-shaped tube will begin to vibrate. The rapidity of the movements in the *Mt* will of course depend on the pitch of our own voice or on that of the tuning-fork employed. If it makes more than thirty vibrations a second, the gas flame will seem to remain at rest, because rapidly repeated impressions of light act on the eye like a constant illumination. Nevertheless this property of light can only prevent us from observing the rhythmically waving flame so long as the latter *constantly impinges upon the same spot in the retina*. But if we look at the flame whilst turning our head to and fro, or if we follow the reflection in a *rotating mirror*, various portions of the retina will be excited and the movements of the flame made visible; the steady flame revealing a band of light with two *straight* boundary lines, the agitated flame a band of light with *wavy* outlines, representing the optical picture of the vibrating *Mt*. These outlines must necessarily be small on account of the small excursions of the *Mt* when set in vibration by the waves of sound. I am not aware whether the precise extent of these excursions has yet been fixed, but Helmholtz has shown that the excursions of the

stapes in an air-tight meatus vary from $\frac{1}{18}$ to $\frac{1}{14}$ mm. Riemann on the other hand has proved that during the vibrations due to a faint sound the excursions of the stapes could not be recognized with the microscope. For these reasons it is plain that the excursions of the gas flame in the mirror in my experiments must be a largely magnified representation of the actual movements of the *Mt*. And now by mathematical calculation we may easily demonstrate that the excursions of this flame must be about one hundred times as great as the actual excursions of the *Mt* during vibrations produced by waves of sound. Thus only can we explain the possibility of optically representing to the naked eye the movements of the *Mt*.

This experiment is most beautifully seen in those persons who can voluntarily open either one or both of their Eustachian tubes, so that the intonation of their voice can pass directly through the tube as if through a hearing tube.

3. BARTH presented a paper on *The need of careful observation in testing the hearing*. Amongst other suggestions he urged that the same word should not be pronounced repeatedly, because it has been found that frequent repetition of any word causes it to become audible when not heard at first, and thus we gain a false impression of the acuteness of hearing.

4. In the following paper BARTH urged the use of hot-water irrigations (65° to 70° C. = 150° to 170° F.) in severe epistaxis, citing one or more cases subsequent to galvano-cauterization of the inferior turbinated bone. The author also mentioned a case of tamponage of the nostrils continued for twenty-four hours and terminating fatally with all the symptoms of meningitis.

During the discussion several fatal cases of epistaxis were reported, and the general opinion was revealed that in epistaxis, as in uterine hemorrhage, hot-water irrigations were of the greatest benefit.

5. HARTMANN exhibited a large number of preparations of the ridge- and thorn-like processes of the nasal septum, showing that they arise from a line running from the spina nasalis to the rostrum sphenoidum.

6. HARTMANN presented a patient in whom he had extended the opening of the mastoid into the tympanic cavity. A drainage tube had been introduced from the opening in the mastoid through the antrum and upper part of the tympanum out of the external auditory meatus. A permanent communication between the auditory canal, attic, and antrum had been the result, with entire disappearance of all the inflammatory symptoms.

7. Amongst the specimens and instruments exhibited at this stage in the proceedings we may call attention to a binocular mirror for examining the ear and pharynx.

8. TRUCKENBROD spoke of the great merits of the late Dr. von Troeltsch, and recommended the erection of a suitable monument to his memory at Wuertzburg.

9. STIMMELL read a paper on *Delstanche's method of straightening the deviated nasal septum*. It produces considerable purulent rhinitis but is usually successful in its aim, and is worth recommending to the profession.

10. HECKE details *Two cases of caries of the osseous wall of the lateral sinus*. In the first the external aspect of the bone was healthy. On opening the mastoid caries was found, laying the bone bare. Recovery. The second case, showing disease of the mastoid externally, was operated upon, but proved fatal, probably from thrombosis.

BARTH reported a similar case and spoke of the general management of acute and chronic mastoid disease. His remarks opened an extensive discussion of the subject which offered many details of interest but nothing essentially new to our readers.

11. MÜLLER, of Stuttgart read a paper on *The anatomy of the floor of the tympanum*, toward which he had turned his thoughts owing to the reputed case of injury of the bulbus venæ jugularis during paracentesis of the *Mt*. He made experimental paracentesis on one hundred macerated temporal bones in order to discover how such an accident could possibly occur. The position and form of the tympanic floor are chiefly dependent on the extent of the jugular fossa, which varies exceedingly. Sometimes it has bulged upward and worn away the floor, till it has produced an actual opening. Müller discovered in 100 specimens, 16 of bulging and thinning of the sulcus tympanicus and in 5 of these the floor was as thin as tissue paper. Two preparations showed dehiscence. These tests agree with Zuckerkandl's discovery of 19 curvatures of the fossa jugularis in 67 temporal bones, and with Toynbee's 25 defective floors in 1,000 temporal bones. When the excavation is well pronounced the fossa sigmoidea and the sinus transversus are protruded. Of the 16 preparations 12 were on the right side, and only 4 on the left, a fact previously noticed by other authorities.

12. HARTMANN brought the session to a close by exhibiting Zeiss' ear microscope, which undoubtedly reveals minute alterations in the *Mt*, but is not at present of any practical value.

REPORT OF THE SESSIONS OF THE OTOLOGICAL SECTION OF THE TENTH INTERNATIONAL CONGRESS AT BERLIN, AUGUST 4-10, 1890.

Reported by A. BARTH, and translated by Dr. J. A. SPALDING, Portland, Me.

August 4th.—LUCAE, President.

I. ZAUFAL reports on the relations of micro-organisms to inflammations of the middle ear and their complications. The organisms that may excite these types of inflammation of the middle ear are the diplococcus pneumoniæ of Fraenkel-Weichselbaum, the streptococcus pyogenes, the staphylococci albus and aureus, and the bacillus of Friedlaender. Others are more or less doubtful. The various micro-organisms do not produce any especial morbid symptoms, whilst the complications depend on local and anatomical opportunities. It is probable that even the healthy tympanum contains germs. The infection generally depends on transmigration from the naso-pharyngeal space, especially after operations, no matter whether accompanied with abundant or slight hemorrhage, whilst in other cases the infection seems to follow the vascular circulation. We do not know all of the causes which make an inflammation chronic, though secondary or tertiary infection plays a possible rôle. Many cases are probably due to diminution of the strength of the virulence by the contest between the tissues and the various medications employed, so that a prolonged duration of the morbid process is thus facilitated. In conclusion, Zaufal tabulated all the micro-organisms discovered in chronic middle-ear suppurations, but insisted on a scientific demonstration so far as the actual ætiology is concerned.

August 5th.—DELSTANCHE, President.

Moos resumes the topic left unfinished at the previous session, taking up *the paths of invasion* by which micro-organisms enter

the middle ear; also hæmatogenous *congenital* otitis media and the same *after birth*, which arise from participation of the lymphatics, especially in the infectious diseases.

A second path is through the tube *directly* or *indirectly*, through the juice-clefts in scarlatinal necrosis of the pharyngeal tissues, avoiding the pharyngeal ostium.

Still another path is through the *previously intact Mt* (Moos observed this occurrence in erysipelas) as well as through the same when perforated. Finally the microbes may reach the middle ear from the cranial cavity, through the fissura petrosquamosa. The dural processes act as intermediators (as *e. g.* in epidemic cerebro-spinal meningitis), yet bacteriological proof is still lacking.

Moos further discussed all of the complications of suppurative middle-ear diseases—erysipelas, facial paralysis, meningitis, cerebral meningitis, thrombo-phlebitis, pyæmia (its origin, the various micro-organisms which play a rôle in this process). Many different organisms may be present at the same time, yet the lion's share in the disease falls to the streptococcus pyogenes.

In conclusion he described particularly tuberculous otitis and miliary tubercle.

In the discussion the question arose whether the middle ear might not become infected through the tubes by the medication employed, but no decided opinion was offered confirmatory of such a view.

2. *Cholesteatoma of the ear* by KUHN. Case of a man with acute disease of the middle ear. A large pearly tumor which had eroded the inferior maxillary articulation, sigmoid sinus, and posterior cerebral fossa.

After a critical review of all the articles on this topic published within the last ten years, Kuhn came to the conclusion that the pearly tumor of the ear is either a *genuine heteroplastic neoplasm* (Virchow), or that in a few rare cases of chronic aural suppuration, the *epidermis of the perforated Mt*, or of the *external auditory meatus* extends into the bony cavity of the middle ear, and forms stratified tumors by persistent exfoliation of horn-cells.

BEZOLD thought that these tumors were not to be regarded as specific tumor-formations, nor the product of an inflammatory process, but rather as a curative process, and deserving the neutral name of a "desquamative process." They are not only a result of former suppurations, but of catarrh, especially of the tubes. The treatment is not more unfavorable than in middle-

ear suppurations, but it generally lasts longer. Still we more often see the hyperproduction of epidermis permanently cease.

Amongst various remarks in the animated discussion following this paper, Barth suggested renewed investigations, to see if cells which cover a surface whether of ecto-, meso-, or endo-thelial organs can under certain circumstances degenerate epidermically or not. Zaufal thought that such experiments might be made on animals.

August 5th, P.M.—MCBRIDE, President.

3. HESSLER inquires: *Whether the opening of the mastoid process from the meatus can be regarded as of equal value with the usual methods.* He thinks that in every case we ought to begin with Schwartze's method, and then according to Bergmann to chisel the bone forward over the meatus, and to remove the posterior and superior walls of the meatus, the farther the suppuration and caries have extended over the squamous portion of the bone.

4. *After-treatment of the chiselled mastoid process*, by KRETSCHMANN. If suppuration is still present the incision is not sutured, but simply tamponed. The first bandage remains six days, on the average. Afterwards it is renewed every two or three days, the opening cleansed with disinfecting lotions, and, if the suppuration still persists, the tympanum is cleansed from the tube by means of the catheter. Where there is danger of the disinfecting lotions being swallowed, solutions of common salt should be substituted. The incision should not be permitted to cicatrize till the suppuration has entirely disappeared for several months.

5. STACKE read a paper on *The indications for excising the hammer and anvil.* The operation, together with a possible excision of the *Mt*, is advisable in all obstacles to conduction this side of the stapes. It is not advisable in sclerosis. It is of the greatest importance in diseases of the ossicles and of the surrounding tympanic walls, even in cases of cholesteatoma. The subsequent amount of hearing is on the average rather greater after the operation than less. In many cases Stacke circumcised the auricle, and then, after crossing the meatus obliquely and removing the hammer and anvil, he chiselled away the upper and posterior wall of the meatus, so that the tympanum became accessible and the tegmen was laid bare. Suture of the auricle and drainage follow the operation. When the antrum is involved, a sound is passed into the aditus, and under its guidance chiselled open. The results are reported to be good.

LUDEWIG mentioned that in two cases of extraction of the hammer and anvil he accidentally removed the stapes ; no fever followed.

6. SEXTON read a paper on *Excision of the drumhead and ossicles*. His experience and views are published in the previous number of these ARCHIVES.

August 6th, Morning Session.—POLITZER, President.

7. STEINBRÜGGE : *Pathological anatomy of the labyrinth*. After description of the methods of investigation, the author passes to Ménière's disease, which has no typical form. He speaks of infection and the subsequent alterations, and the condition of the parts in constitutional diseases. The pathological alterations in the cochlea are most often discovered in the inferior convolutions.

8. *General discussion on the prognosis and treatment of progressive deafness in chronic non-suppurative otitis media*. The first speaker, MCBRIDE, subdivides the cases into those purely catarrhal, those that are non-catarrhal (inherited, rheumatic, and nervous), and the syphilitic. The former are the most amenable to treatment. There are plain indications for inflation and bougeing in a number of cases, as well as the need of particular attention to the naso-pharynx. In other cases there is but little if any chance for improvement. In cases of nervous origin, the bromides are excellent.

GRADENIGO's paper on the same topic has already appeared in the previous number of these ARCHIVES. As none of these cases are of an infectious nature, the treatment must consist chiefly in *excitation of the vitality of the parts involved*.

August 6th, Afternoon Session.—GELLÉ, President.

9. KIRCHNER : *On the origin of cholesteatoma of the temporal bone*. He explains the great tendency to relapses by the impossibility of removing all traces of the disease by operation or treatment. He has found the tumor deeply proliferated in the Haversian canals. (Microscopic preparations.)

10. The same author spoke of an *extravasation in the chorda tympani*. The preparation shows an extravasation in the nerve-sheath of the chorda tympani in diphtheritic inflammation of the tympanum.

11. KATZ: *On the histology of the cochlear canal with microscopic specimens.* The ligamentum spirale, being so rich in vessels, must have the power of contraction and expansion, without the assistance of the cochlear muscle. The epithelial layer of the stria vascularis, so well defined at first, but afterward so closely united with the underlying vascular layer, makes us think that there is such a thing as a vascularized epithelium.

12. DRAISPUL: (a) *On the anatomy of the Mt.* The membrana propria of the *Mt* is a continuation of the periosteum of the annulus tympanicus. (b) *On the development of the malleo-incudal articulation.* The embryo of swine exhibits, on the articular surface of the hammer, a process which corresponds to an excavation in the anvil. As development proceeds this process loosens itself from the hammer and unites with the anvil. This union often ensues without the preliminary loosening, so that swine seem to stand in the middle between the animals in which a malleo-incudal articulation always exists, and those in which both ossicles are united into one.

13. POLITZER: (a) *On the cholesteatoma question.* Demonstration of several specimens where the epidermis of the *Mt.* or meatus passes through perforations into the middle ear, where the cholesteatoma almost always arises. The important point to the author is whether the tube is open or not. Three specimens of cholesteatoma in the external meatus with enlargement of the calibre of the passage. (b) *Pathological anatomy of the ear.* 1. Two preparations from deaf-mutes, with ankylosis of the stapes and posterior upper wall of the pelvis ovalis, and atresia of the round window. 2. Right pyramid of a deaf person with columella formation. The stapedius muscle is absent. 3. A specimen showing cure of suppuration in perforation of Schrapnell's membrane. Politzer will study this case before he can make up his mind to favor removal of the ossicles. 4. Two specimens showing adhesions of the *Mt.* with simultaneous mobility of the stapes. (c) A new ear catheter, with an *oval orifice* in order to fit better into the orifice of the tube. *He also recommends the adoption of a unit for the size of Eustachian catheters.*

August 7th, Morning Session—GRUBER, President.

14. KESSEL: *On anterior tenotomy.* Introduction contains notes on the acoustic perceptions in their various relations: intensity, pitch, resonance, and final transmission of the irritation

to the terminal organs of the labyrinth. The importance of undisturbed function by the muscles of the middle ear for the normal transmission of sound is clearly emphasized, and from that the following indications are advanced for the performance of the tenotomy : (1) In paralysis of the musculus stapedius and impaired function of the tensor tympani ; (2) permanent spasm in the tensor ; (3) perforations of the *Mt*, in the region of the light spot ; (4) catarrh with swelling. The indications under 3 are particularly important to investigate.

Sclerosis anchylosis and nerve atrophy are contra-indications.

15. *Statistics of ear diseases.* Opening of the discussion by BUERKNER, who exhibits his schemata and statistical reports of his clinique. JACOBSON argued on the inefficiency of the schemata, which do not permit any direct comparison of the various reports. A committee was appointed to investigate the whole question.

16. SCHWABACH : *Tests for hearing and the proposed unit for the indication of deafness.* None of the instruments so far produced can be regarded as a reliable unit because every one gives one-sided results. Tests with the whispered voice are rejected and Wolfe's method recommended. Edison's phonograph is useless as a test of the hearing. In order to gain an approximately safe diagnosis of the probable locality of the deafness it is necessary to consider the history, the objective condition, the clinical course, and the results of the tuning-fork tests. A reliable test is the duration of perception on the bones of the head. Magnus was of the opinion that Knapp's suggestion of a fraction with 100 as the denominator and the distance heard as the numerator was the best so far suggested. Magnus also preferred the spoken voice to the whisper, and urges the adoption of some unit. The denominator of the new fraction could be easily ascertained by testing several people with normal hearing.

17. GUYE : *On the aetiology of tympanic inflammations caused by syringing liquids through the nostrils.* Syringing into the nostrils should never be attempted till the surgeon has convinced himself of their permeability. If this is unsatisfactory, the simple pouring of fluid into the nostril may be permitted. Even if the nostrils are perfectly permeable, the nozzle of the syringe should never be pushed in so far as to fill the orifice hermetically.

18. BERTHOLD : *Myringoplasty.* This is to be attempted only after all pathological processes in the tympanum are healed. If the margin of the perforation is cicatrized it should be freshened

with a minute knife. Human skin or the membrane of the egg can be used. If the defects are large or total the transplantation should be carried over to the mucous membrane of the middle ear; the meatus is then to be filled with boric acid. The cure is permanent and the hearing, in a large percentage of cases, is improved.

19. GIAMPIETRO: *Diagnosis and cure of otitis suppurativa chronica.*

20. *Deaf-mutism in Norway.* Statistical paper.

21. *Deaf-mutism in Denmark.* Since 1817 compulsory education of deaf-mutes. For the year 1886, 0.64 per cent. of the people are deaf-mutes. The sexes are about equally divided. There is greater frequency of deaf-mutism in those provinces in which epidemics of scarlatina or meningitis have raged. Deaf-mutes do not marry so often as those who can hear. Their marriages are almost always sterile. When only one of the married couple is a deaf-mute, there are less number of children than in couples with good hearing. But it is worth mentioning that *none of the children of these latter marriages were deaf-mutes.*

August 7th, Afternoon Session.—ZAUFAL, President.

22. GELLÉ: (a) *Otitis and facial paralysis.* Out of thirty-one cases of facial paralysis which were examined particularly for their possible connection with inflammations of the ear, the author discovered that the connection actually existed, especially when peculiar pains and vertiginous symptoms were present, even if no direct middle-ear disease could be demonstrated. The condition of the middle-ear muscles and of the hearing during the disease is described. The treatment is antiphlogistic, as usual in inflammation of the middle ear. (b) *Audition and facial paralysis.* In contradistinction to the cases just depicted, Gellé saw a case of central total facial paralysis with normal hearing. There were many symptoms of paralysis of the tensor tympani; the function of the stapedius was intact. No hyperæsthesia, no pain, no vertigo, no subjective noises. (c) Presentation of various instruments.

23. BEZOLD: *Demonstration of means for testing the hearing.* Our most common tests for hearing do not suffer in comparison with Snellen's tests of the amount of vision. Speech is the most perfect test for defining the perception of sounds. The author uses eight different tuning-forks with movable weights, and three organ pipes which give a constant series of tones.

24. SHIRMUNSKY : *A new method of maintaining patency in artificial perforations of the Mt*, consists in only once touching the edges of the artificial opening with chromic acid. It never closes afterwards.

25. BISHOP : *Atresia of the external auditory meatus*.

26. BOTKY : *Experiments on the removal of the stapes in animals*. These experiments and a case in a patient prove that the evulsion of the stapes in animals is free from danger. An occlusive membrane is always subsequently formed. All of the animals heard after the operation. Animals from whom the entire sound-conducting apparatus had been removed, but who still possessed the oval and round windows, hear better with similar circumstances than those with ankylosis of the stapes. If we excite a slight inflammation of the promontory so that externally no stapes ankylosis arises, we find the ankylosis deeper in. If Botey's results are confirmed by other observers and if the results of the operation are always so favorable in mankind, it would be regarded as a great advance in the treatment of ankylosis and middle-ear sclerosis, which the author compares with the cataract of the eye.

August 8th, Morning Session.—SEXTON, President.

27. GRADENIGO : (a) *The auricle in the insane and in criminals*. It is oftener and at the same time more considerably deformed than in other persons. If only one auricle is affected it is generally the right, but the left stands off from the head the most prominently. (b) *On the morphology of the anti-helix in man*. See the previous number of these ARCHIVES.

28. SECCHI : *Experimental investigations into the physiology of the middle ear*. Chiefly on the determination of and variation in the endo-tympanal pressure. The author promises full details in later papers. Some symptoms incline him to believe that the waves of sound are conducted, *not so much through the ossicles as rather from the Mt, to the round window according to Pascal's theory*.

29, 30, and 31. Papers on *aural affections during and after the influenza*. Nothing particular in the general type and course of such a middle-ear disease, except that very rarely we meet with one or two cases with severe symptoms, such as abundant hemorrhage, followed with well-marked sequelæ and complications, whilst these are followed with a long run of very mild cases.

32. LUCÆ : *A new hearing trumpet*.

33. WEGENER : *Schwartz's method of treating cholesteatoma*, which consists chiefly in formation of a skin flap and subsequent treatment with an iodoform oil emulsion.

34. VOHSEN : *On the operative method in otitic cerebral abscess. Case of otitic cerebellar abscess with a specimen.*

35. KAISER : *Diplacusis*. There are two forms : D. dysharmonica, and D. echotica. A case of the latter variety is reported. The tinnitus and diplacusis disappeared after several catheterizations. D. dysharmonica is explained by false attuning of the membrana basilaris. The D. echotica may be due to prolongation of the tone, with retarded perception in the central organ, or to prolonged nerve conduction.

36 and 37. SEXTON and LUCAS : *Exhibition of new instruments.*

38. CHOLEWA : *A new palate holder.*

REVIEW.

Prof. Dr. STEINBRÜGGE: **The Pathological Anatomy of the Hearing Organ.** (No. 6 of the Text-book of Special Pathological Anatomy by Prof. Orth.) Berlin, 1891: August Hirschwald. Pp. 125. Reviewed by A. KUHN, Strassburg. Translated by Dr. MAX TOEPLITZ, New York.

The steadily increasing number of pathologico-anatomical investigations of aural affections, and the variety in their results, prompt the authors of extensive pathologico-anatomical text-books to confide the critical analysis of this material to the best-adapted representatives of otology.

In the year 1878 Hermann Schwartz first published in Klebs' text-book of pathological anatomy a systematic treatise of the pathological anatomy of the ear. Ziegler for his text-book of special pathological anatomy (1886) has intrusted our colleague Wagenhauser with the elaboration of the subject of the ear, and this work also owes its origin to the pen of an aurist, "because the study of this special province is out of the daily working field of the pathological anatomist."

These words, uttered by Orth, the excellent anatomist of Göttingen, give not only great satisfaction to the aurist, after the general undervaluation shown heretofore to our special science, but they acknowledge also the work done during the last twenty years—almost exclusively by aurists in the province of pathologico-anatomical examinations of the ear. If we compare Schwartz's book with this work, we are struck principally by the fact that so much, and especially that so much good work, has been done in our province in the brief period of twelve years.

In addition to the numerous papers upon the pathologico-anatomical changes of the ear, contained in Schwartz's book, which on account of the large experience of the author was very

complete for that time, a further number of investigations have been published in the last decennium, to which Steinbrügge has given full justice with critical precaution and based upon his own studies.

It is not my task to discuss the single chapters of a pathologico-anatomical text-book, but I will emphasize only the most excellent part, treating of the anatomical conditions in diseases of the labyrinth. Steinbrügge has for years proven by his papers that he "has penetrated and is fully conversant with this extremely difficult province," and, like a few others, has been enabled to give us a concise and clear picture of the known anatomical changes in the nervous apparatus of the hearing organ.

It is obvious from the great difficulty of the finer anatomical examination of the inner ear, that not very long ago by far the greatest number of functional disturbances of the hearing organ were considered genuine diseases of the middle ear. The technique of the histological studies of the normal membranous labyrinth, which has been greatly improved during the last fifteen years, enables us to demonstrate and appreciate the pathological changes of the inner ear.

The author, therefore, is justified in placing the fact in the foreground, that the labyrinth is implicated in many cases of diseases of the middle ear, especially in those following infectious diseases and nutritive disturbances due to alteration of the normal composition of blood. These changes in the inner ear do not appear in the form of microscopic and extensive destructions of the membranous structures, but only as labyrinthine hyperæmia and microscopic extravasations of blood.

Such aural apoplexies may develop from sudden ærial rarefaction in the external ear, and the sudden absolute deafness of those who for years have been more or less hard of hearing on account of chronic middle-ear affections is to be explained by similar hemorrhages in the labyrinth and in the cochlea.

Besides these hyperæmiæ and extravasations of blood consecutive to middle-ear affections, Steinbrügge describes the well-known primary and homogeneous changes of the inner ear in disturbances of circulation, gravidity, leukæmia, traumatism, etc.

In the labyrinthine inflammations from various causes the author finds the necrosis of tissue and the suppuration resulting therefrom, and also the consecutive reactive new formation of vascular connective tissue and of bone to be homologous to the

tympanal anatomical changes in inflammations of the middle ear. This is apparent principally in the acute inflammations of the inner ear in consequence of cerebro-spinal meningitis and of diphtheria ; similar observations have been made by Steinbrügge in a case of osteomyelitis, and, in accordance with other authors, in tuberculosis, syphilis, and leukæmia.

Furthermore, all these labyrinthine lesions, with reference to their connection with the middle ear, are especially discussed. Just in these chapters we find many new and interesting observations.

It may suffice to point this out and to intimate to our special colleagues that Steinbrügge has provided us for this heretofore obscure province of the affections of the inner ear with all the facts which can be given in the present state of science. For the microscopical examinations of the osseous and membranous labyrinth the author instructs us about the most appropriate methods of decalcification and preparation, the practical value of which have been tested by many of us. They require, I regret to say, too much time.

The numerous studies on the occurrence of micro-organisms in particular aural affections are exhaustively considered, and their connection with and influence upon the morbid processes clearly criticised. The book, clearly written and well gotten up with many excellent microscopical drawings, is a magnificent guide to those who intend to make a special study of the pathological anatomy of the ear ; it will be, however, of great benefit also to the expert on account of its completeness and its criticisms.

MISCELLANEOUS NOTES.

August 4, 1890, at which date the International Medical Congress and its otological section were opened, by a peculiar coincidence also the twenty-fifth anniversary of the appointment of Prof. LUCÆ, the introducing president of the section, at the University of Berlin as Lecturer in Otology took place. At the request of Prof. GRUBER the assembled aurists celebrated this event at that opening meeting by an ovation. Furthermore, it was resolved to present LUCÆ in commemoration of that day with an album containing portraits of all the members of the

section, and the execution of this idea was intrusted to JACOBSON, who had been LUCÆ's assistant for many years. The presentation took place on January 4, 1891. At the desire of Dr. JACOBSON, who was, I regret to state, prevented by a death in his family from being present, Dr. DENNERT and Dr. JANSEN, the oldest and youngest assistants, and also the undersigned as secretary of the section, presented Prof. LUCÆ at his residence with the album, a masterpiece of modern industrial art, containing portraits of almost all the members of the section. Dr. DENNERT expressed in eloquent words the veneration of the colleagues for LUCÆ and his work in otology. In conclusion he wished that LUCÆ might be spared to celebrate his fiftieth anniversary as lecturer with equal mental vigor. In his answer LUCÆ, after heartily thanking the Society, said : Twenty-five years ago, it was a daring attempt to devote one's self to otology, since one ran the risk of being considered a charlatan by the laity as well as by the physicians. At that time one man had always inspired him with new hope when courage had left him, and this was RUDOLPH VIRCHOW. Although otology to-day holds a position co-ordinate with the other branches of medicine, many questions are still to be solved, and he promised, as long as possible, to do his share of investigation and labor.

DR. KRAKAUER.

BERLIN, January 5, 1891.

ERRATUM.

Page 60 of this volume, line 13 from above : *favoring*, instead of *due to*. [In very young children the ossification of the nerve canals is frequently not yet completed.]

ANNOUNCEMENT.

OWING to the steady increase of important contributions (freely illustrated by numerous wood engravings and superb lithographic and colored plates) which have been accepted for publication in the ARCHIVES OF OTOTOLOGY, the Publishers find themselves compelled to raise the annual subscription price from \$3 to \$4. The latter is the price at which the German edition, though costing less money to produce, has been issued ever since the separation of the ARCHIVES OF OPHTHALMOLOGY AND OTOTOLOGY into two independent periodicals. No reduction can be afforded to subscribers taking the two journals, ARCHIVES OF OPHTHALMOLOGY, and ARCHIVES OF OTOTOLOGY, and the subscription for the two will be hereafter \$9 a year. The increase in price will go into effect January, 1892.

G. P. PUTNAM'S SONS, PUBLISHERS.

SEPTEMBER, 1891.

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